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Casting Steel and Alloys in a Vacuum

Machines and Apparatus that Have Been or Are Now in Daily Use—The Advanced State of the Art of Die Casting

BY E. F. LAKE

While casting metals *in vacuo* is an old principle, it has not not been developed to any extent until quite recently. Occluded gases and those segregated in large enough volumes to form miniature bubbles or the larger blowholes, are only beginning to be recognized as the real injurious elements in metals of all kinds. The oxygen, nitrogen and other elements that form these gases, enter into combination with the elements that are parts of the various alloys from which castings are made and form oxides, nitrides, etc., and thus detrimentally affect the strength, wearing qualities and other properties that it is desirous to obtain in the various metal parts that are manufactured. By melting metals, or casting them in a vacuum, these gases can be almost entirely removed and the mechanical properties of metals or alloys greatly improved. This principle is fast growing in favor and therefore, it may not be very long before casting in a vacuum will be quite common.

A vacuum in connection with melting metals has been used to some extent with very good results. Some metals are very brittle substances and when worked by ordinary methods, cannot be rolled and drawn. When melted in a vacuum, however, they have been drawn into wire for various purposes. Examples of such metals are tungsten and tantalum, which are made into wire for incandescent lamps. Another metal that very difficult to melt in the open air is magnesium and this has been readily melted in a vacuum furnace. This is accomplished by building an air-tight chamber around the melting pot or furnace and pumping out all of the air. An electric current then generates the heat necessary for melting the metal and no oxidation can take place, as the oxygen has been removed, likewise, the nitrides, sulphides, phosphides, etc., do not form and the metal has a more dense, homogeneous grain than can be given it by any other process. No oxidizing effect can, therefore, be given the metal when a good vacuum is obtained and the reducing effect of the atmosphere in the furnace is very slight, even at the highest temperatures.

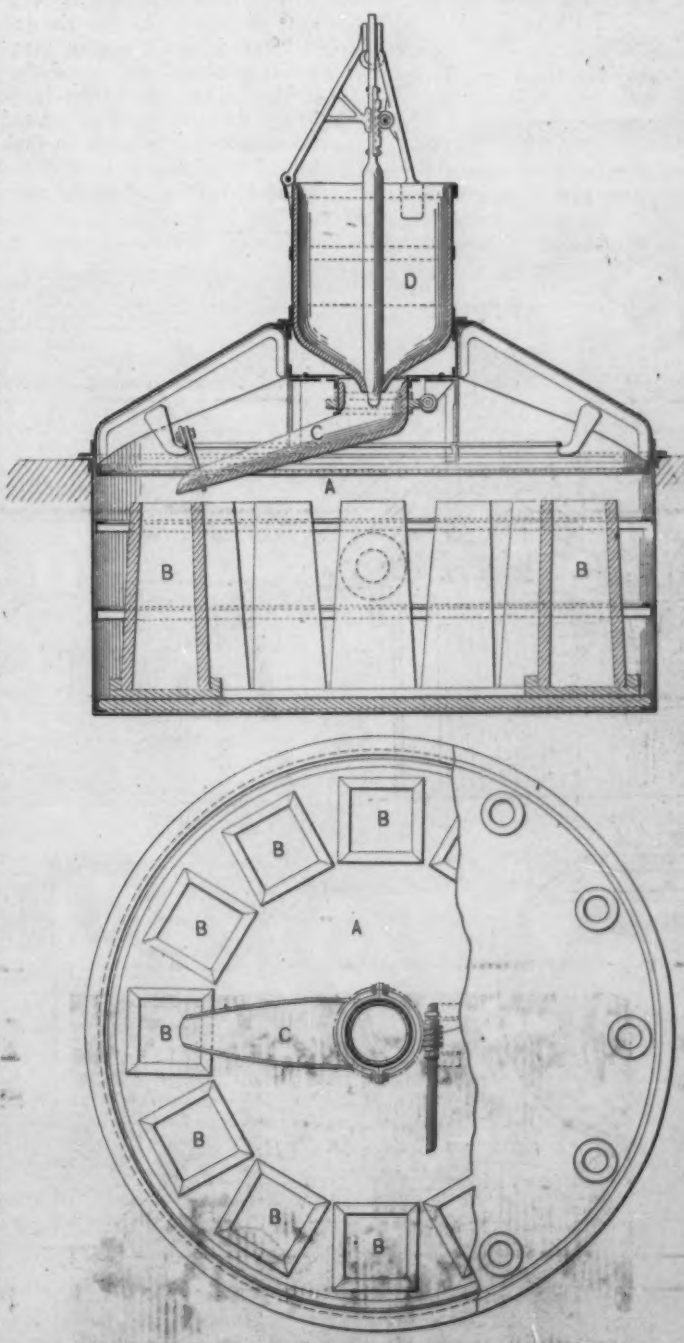


Fig. 1—Teeming Ingots in a Vacuum Chamber

Even though the principle of casting *in vacuo* is very old in this country, the first recorded invention of apparatus for this purpose was that patented by H. V. Barnum, in 1879, as shown in Fig. 2. Here, A is the vacuum chamber, and B a door through which any kind of a mold can be inserted. This door covers the whole end of the vacuum chamber. A clay-lined pot, D, of molten metal is fastened to the top of the vacuum chamber in such a way that no air will be admitted and when the mold is ready to pour,

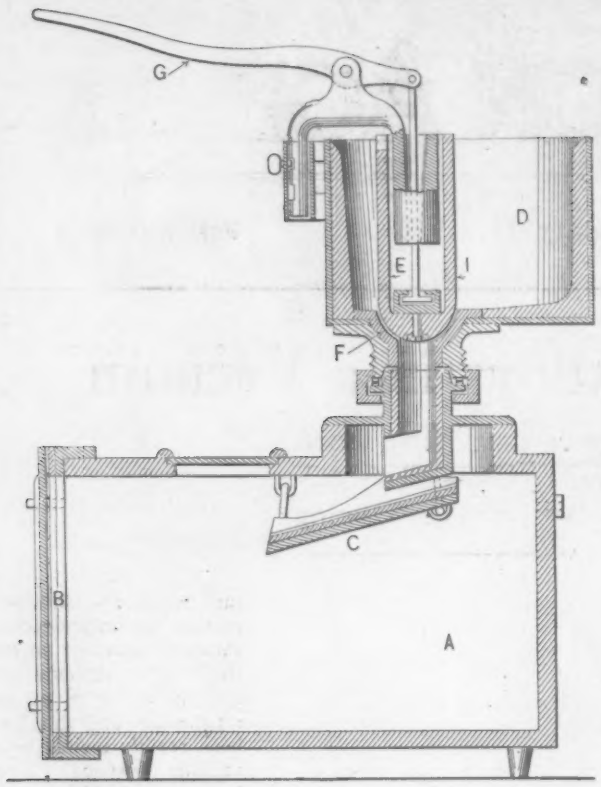


Fig. 2—Apparatus for Casting in a Mold in a Vacuum

valve E, which is made of some refractory material, is raised by lever C out of valve seat F, which is also made of refractory material, and this allows the molten metal to flow from pot D through spout C and into the mold. Spout C is made fan-shaped so the vacuum may cause the escape of most of the gases out of the molten metal as it flows over the surface.

Casting Steel Ingots in a Vacuum

Practically this same principle is used for casting steel ingots by the Ellis May Steel Syndicate, Ltd., of England. This apparatus is shown in Fig. 1. The vacuum chamber A, is sunk below the floor line and holds twelve ingot molds, B, placed in a circle. The ladle of molten metal, D, is brought to the vacuum chamber and located in the center of the cover over spout C. The apparatus is arranged so that when ladle D is dropped into position it makes the vacuum chamber air-tight and the air is then pumped out of vacuum chamber A. When this has been done the spout underneath the ladle is made to revolve from one ingot mold to another until all have been poured. While the metal is flowing through the spout, any gases that may be in the molten metal are supposed to escape. It is said the pipe is thus considerably reduced.

In Fig. 4 is shown an American device for casting ingots *in vacuo*. In this the ingot mold and ladle are constructed in such a way that when the ladle of molten metal is placed on top of the ingot mold, it seals it air-tight. To remove the air from ingot mold A, a tank much larger than the mold is located at B and vacuum pump C brings about a vacuum in tank B. Ingot mold A is connected by piping to tank B and when the ladle of molten metal D is lowered to the top of the ingot, ready to teem,

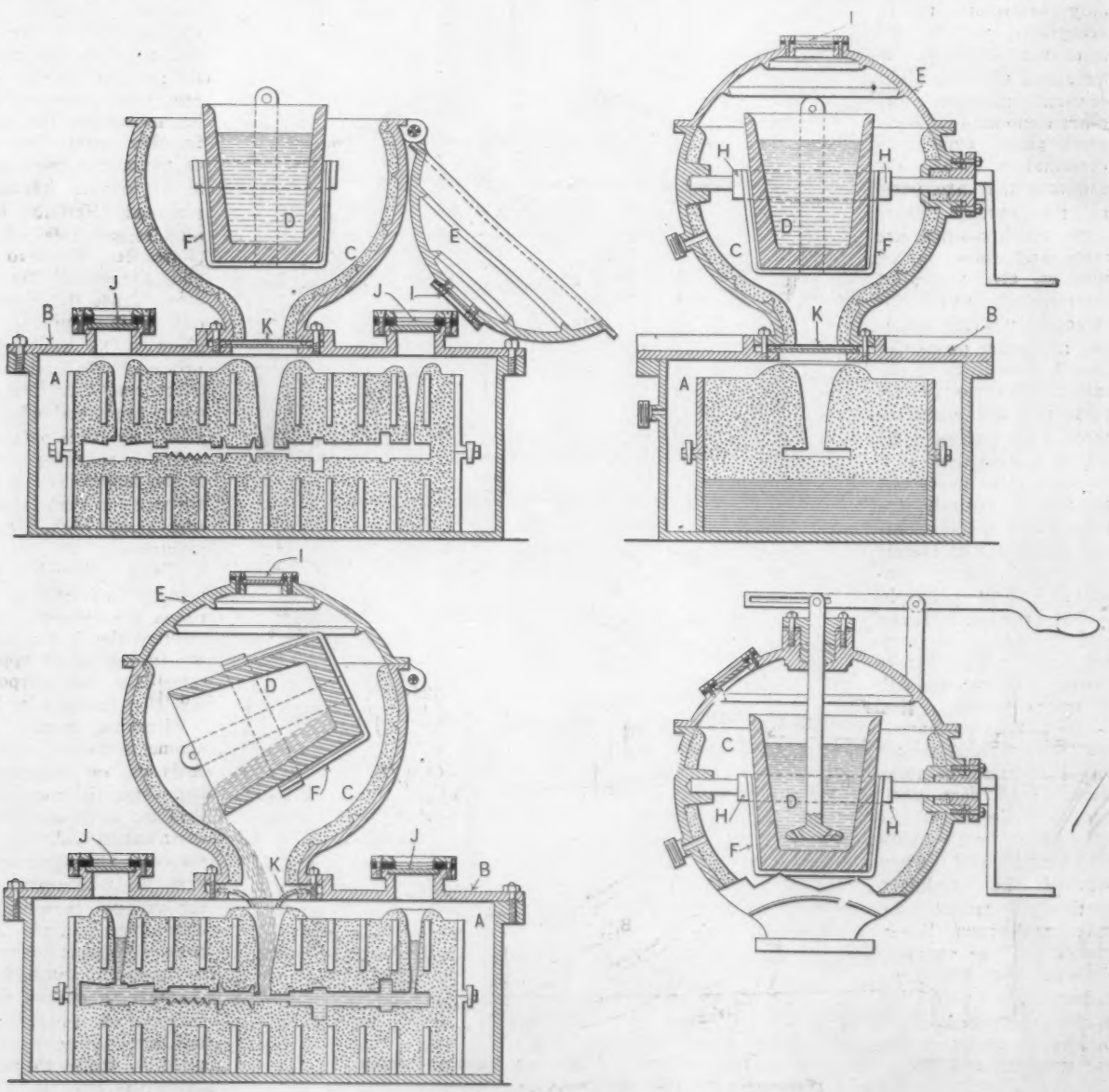


Fig. 3—Equipment for Pouring Sand Molds in a Vacuum.

valve E is turned on and into tank B is exhausted the air in the interior of ingot mold A. The vacuum pump is kept working all the time the ingot mold is being filled. Thus, while the molten metal is falling into the mold and flowing around to different parts, the gases are carried away. With this arrangement a universal joint makes it easy to connect to each ingot mold in a short time and thus very little time is lost.

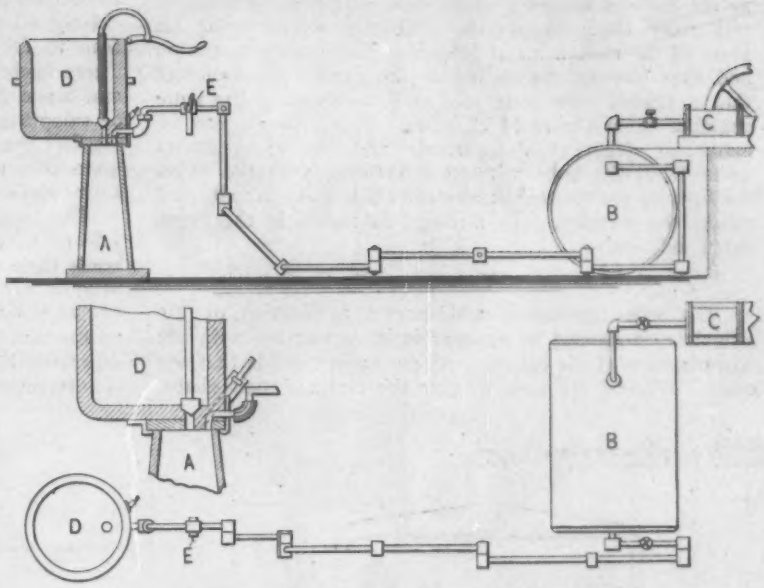


Fig. 4—Exhausting Air from Each Ingot as Teemed

Casting Sand Molds in a Vacuum

Another apparatus for casting sand molds *in vacuo* was brought out in 1893; its construction and method of operating is shown in Fig. 3. In this, A is the vacuum chamber; B, the top which lifts off to admit the mold; C, the ladle container, which is also a vacuum chamber, and D, the ladle. To operate it, cover E is swung back, as shown in the upper left hand view, while the ladle of molten metal is lowered into its holder F. The cover E is then swung over the top and it fits air-tight, as shown in the other views. When the air has been exhausted from chambers A and C, ladle D is turned over in its trunnions H H, and pours the molten metal into the mold. In the ladle cover at I and in the top of the mold chamber at J J, are located glass plates so the operator can see how the ladle is working and when the mold has been filled.

By pouring molds in a vacuum chamber in this manner, the metal more readily flows to all corners of the cavity, filling all interstices and thus producing sharp, clean castings. The vacuum proves a stronger attraction, so to speak, than the molten metal for oxygen, nitrogen and other gases and hence as the metal is being poured into the mold, most of the gases are drawn out of the metal. This overcomes any tendency toward the formation in the casting of blow-holes, gas bubbles, air pockets, cold shuts and like imperfections and the losses from bad castings are greatly reduced.

While exhausting the air from vacuum chambers A and C, the gases and vapors rising from the molten metal are carried away and this renders the metal dead by removing all tendencies toward ebullition. By removing the gases from the metal, a more dense and fine grain is given the castings and as the molecules that form the mass are not separated by these gases they are held together with a great cohesive force. Thus, vacuum castings excel ordinary castings by having greater strength, wearing qualities and other mechanical properties, and by being more homogeneous, soft and ductile.

If desired, an attachment could be easily put on cover E by which the metal in the mold may be stirred by a disk, located on the end of a bar, passing through the center of the cover and attached to a lever on the outside. Such an arrangement is shown in the lower right hand view of Fig. 3. It would hasten the pouring,

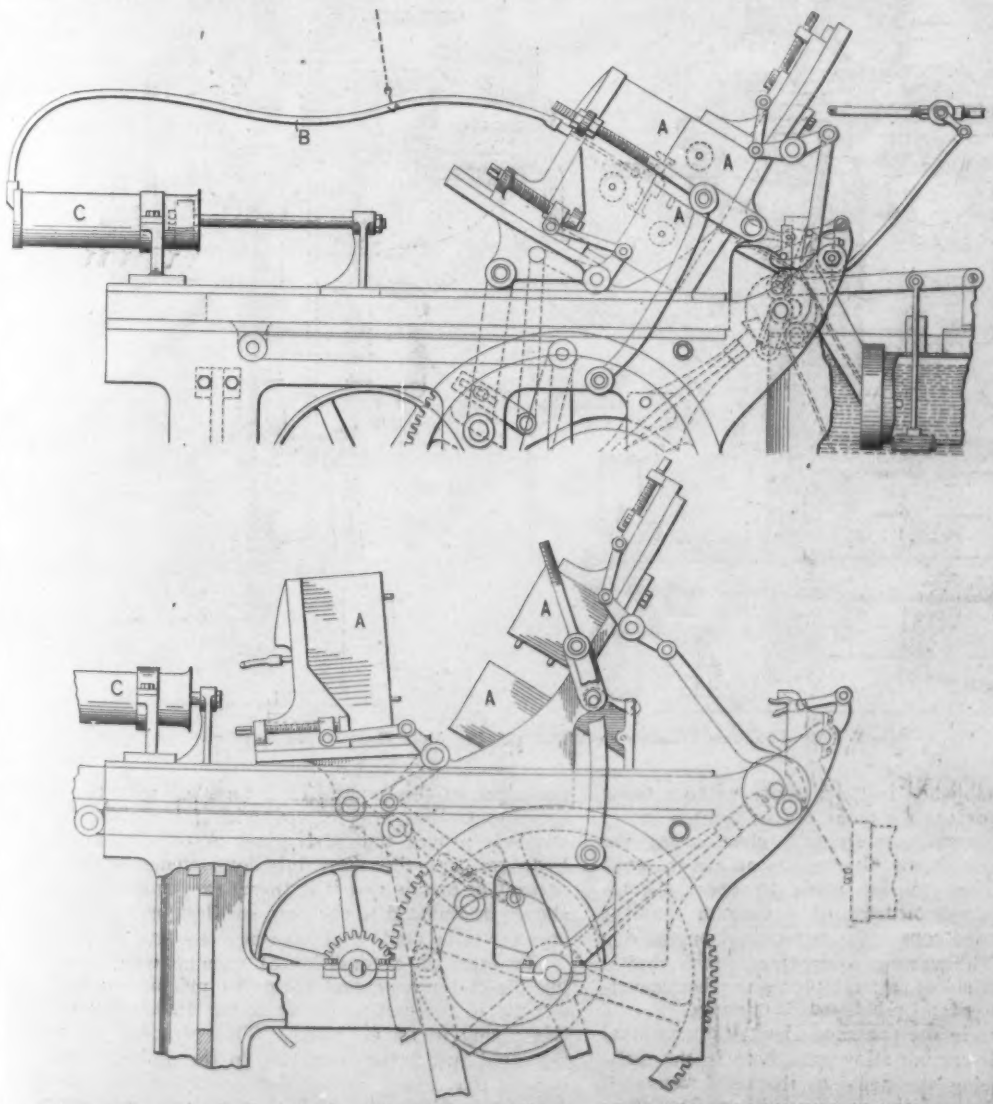


Fig. 5—Exhausting Air from the Die Mold

as the ladle is turned over as soon as the gases cease to rise from the molten metal. Stirring would bring all parts of the molten metal subject to the vacuum condition and thus quicken the escape of the gases. To facilitate this, a fusible plate is located at K to separate the ladle chamber from the mold chamber. Thus, the air can be exhausted from each separately and the gases drawn away from the ladle without interfering with the mold. As soon as the molten metal strikes this plate it melts and allows the metal to flow through, as shown in the lower left hand view.

Application of Vacuum to Die Casting

The most successful and largest application of the principle of casting in vacuum is in connection with the manufacture of die-casting. As permanent molds that are made of metal are used to give the castings their shape, a vacuum can be established in their cavity without using a vacuum chamber, or the die-mold can be located inside of a vacuum chamber without specially constructing the mold; fear of injuring it, or altering its ability to make perfect castings. They can be made to operate automatically either inside or outside of a vacuum chamber and very little additional apparatus is required on the die-casting machines. The vacuum overcomes faults that it is very difficult to get rid of in any other way when squirting molten metal into metal molds under pressure.

When this is done in the presence of air, the continual churning that the die-casting alloy gets, both in the melting pot and when being squirted into the mold, causes it to absorb more or less of the oxygen, nitrogen or other gases in the air, and generally it is more. These gases form compounds with the various metals composing die-casting alloys which greatly weaken them and they also tend to fill them with gas bubbles and occluding gases. These bubbles usually form on the interior of die-castings and make it spongy and porous, while the exterior may be smooth and have a perfect appearance. This is due to the fact that the molten metal, squirted into the mold has a tendency to cling to the metal surface in the cavity, that forms the outer surface of the castings.

The large majority of die-castings that are made outside of a vacuum are of this nature and one has but to break them open to see these miniature blow-holes or gas bubbles. They can very plainly be seen with the aid of an ordinary magnifying glass. When these are present, it means that some of the molecules that form the mass are separated by the gases and their inherent cohesive force is interrupted. Thus, the mechanical strength is entirely destroyed at this point. This, together with the injurious compounds that are formed with the metals, have conclusively proved that such gases as oxygen, nitrogen and hydrogen are the most injurious elements that can be present in metals and it is therefore imperative that these should be reduced to the very smallest percentages if castings are to be made that have any strength properties.

To establish a condition of vacuum when manufacturing die-castings, several forms of machines attach piping directly to the casting cavity in the die-molds and connect this piping to an air pump. This removes the air from the mold just before squirting in the molten metal. This insures that every corner and crevice in the die-mold is completely filled with molten metal and good sharp castings with perfect exteriors are obtained. The losses from

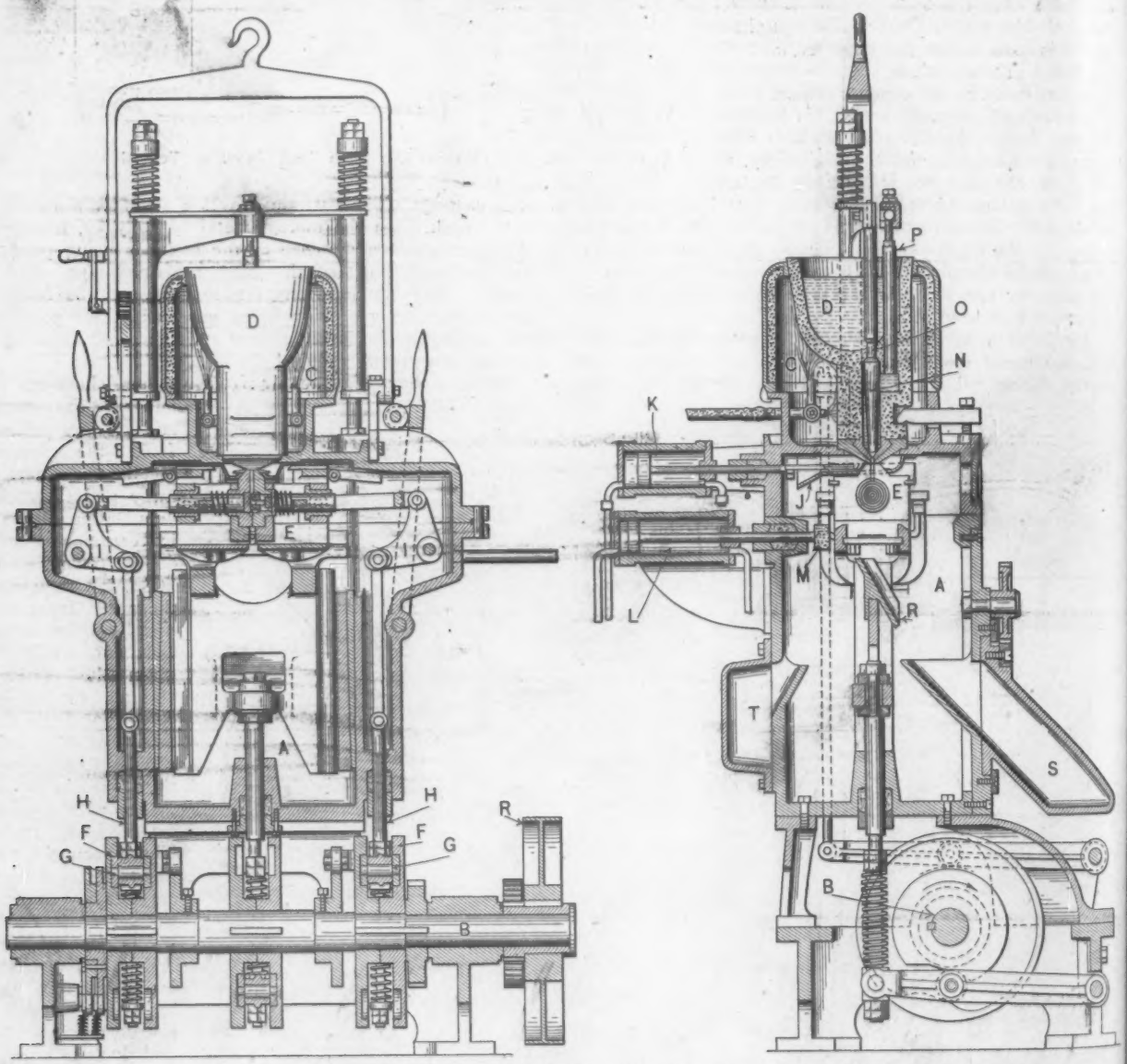


Fig. 6—Machine with Vacuum Chamber in Which the Die Mold Operates Automatically

bad castings are also reduced to a minimum, as air pockets do not form to prevent the molten metal from flowing to certain parts of the mold.

A die-casting machine that uses this principle is shown in Fig. 5. In the upper view, die-mold A, which is in three parts, is connected by flexible hose B to air-pump C. In this position, the die mold is ready to receive the molten metal that forms the casting. In the lower view, the mold is shown as it is opened for the ejection of the casting. As will be seen, the outer half of the mold is located on a carriage that rocks away from the inner half of the mold; while the upper part of the inner half is raised away from the lower part. This machine is driven by pulley and belt and all of its movements are performed automatically by the aid of gears and cams. All the attendant has to do, therefore, is to keep the melting pot filled and carry away the castings.

While the extraction of the air from the die-mold, as shown in Fig. 5, has many good features, it is not possible to extract any of the gases that may be contained in the molten metal. In order to obtain a more complete vacuum, therefore, a die-casting machine like the vertical one shown in Fig. 6, was designed and this is in daily use. Here, a comparatively large vacuum chamber, A, forms the body of the machine and the melting pot D, with its gas-heating furnace C, is located over it in a very similar manner to that of the sand mold casting apparatus shown in Fig. 2, and the ingot casting apparatus shown in Fig. 1. In this case the driving shaft B, with its pulley R, and the cams that control the movements of the machine, are located in the base, below the vacuum chamber.

The die-mold E is located just below the melting pot and inside vacuum chamber A. To make such a machine successful, therefore, the mold must be opened and closed; the molten metal squirted in, and the casting ejected from the mold automatically, and that is the manner in which this machine operates. The mold opening and closing automatically, inside of this vacuum chamber, no air is allowed to collect in the casting cavity, even when the mold is opened to eject the casting. Any gases that may be in the metal when entering the die-mold, are inclined to be drawn through the vent openings of the mold and out into the vacuum chamber. A more complete vacuum can thus be obtained than with the principle shown in Fig. 5. In the latter, the air must be pumped out of the mold before every casting is made. And again, owing to the difficulty of making the die-mold air-tight on the parting surfaces, a high vacuum cannot be realized in the mold. If it were possible to make these surfaces air-tight, it would be exceedingly difficult to part the mold for the removal of the casting.

By placing the die-mold inside a vacuum chamber, as in Fig. 6, these troubles are overcome as a continuous vacuum

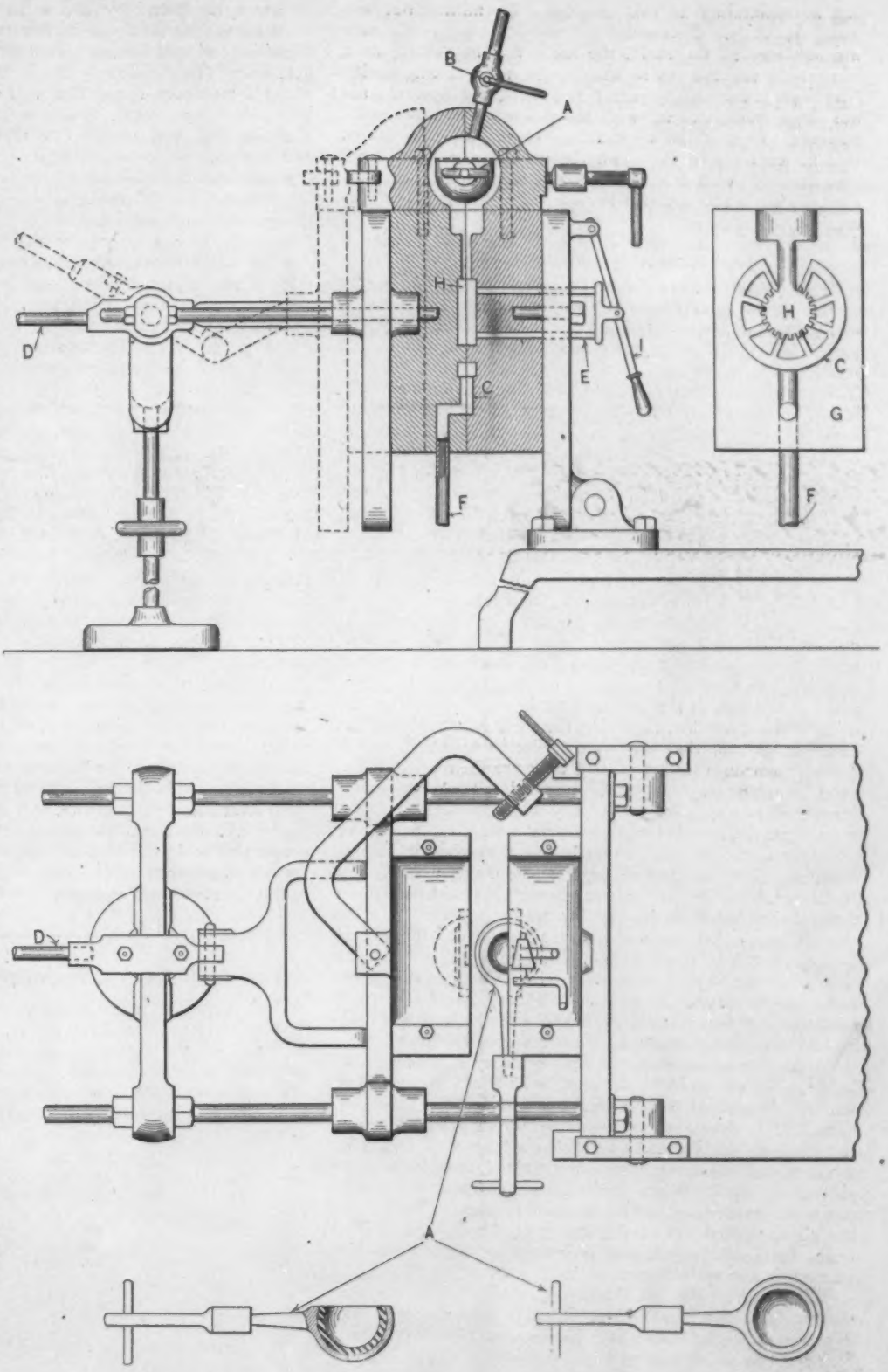


Fig. 7—Air Suction Combined with Air Compression in Die Casting

can be maintained in this chamber. By milling out sections, one or two thousandths of an inch deep, on the parting surfaces of the mold, the mold will be vented, so a continuous vacuum can be maintained in its casting cavity. The mold is then easily parted and these vent openings are not large enough to fill with metal and form fins on the castings. In addition to causing the metal to be drawn into all crevices of the mold the molten metal is forced into the mold with from 80 to 100 lb. per square inch pressure. This tends still further to refine the grain of the castings.

In the left hand view of Fig. 6, the mold is shown closed; but when the double cams F turn over, rollers G on rods H operate levers I and thus pull the halves of the die-mold apart. As there is always a tendency of molten metal dripping when the die-mold is pulled away, or parted, a drip deflector J is immediately pushed under the nozzle and causes any drippings to fall into pocket T. This prevents molten metal from spoiling the finished castings. A second air cylinder L moves Brush M over to brush out the casting cavity in the die-mold. To force the metal into the mold when it is closed, valve N is pulled away from its seat in the nozzle opening and this closes another seat above it at O, where the metal enters the passage from the melting pot. When opening O is closed, plunger P is forced down and this squirts the metal, contained in the passage, into the die-mold.

All of these motions are timed so the various operations will follow each other continuously and manufacture castings without any manual labor except that of filling the melting pot. They are turned out by this vacuum machine much faster than they can be made by any hand-operated machine. In fact, as fast as the metal will solidify in the mold, the casting is thrown out and the mold closed for another without any lost time. As the mold is opened and the castings ejected, they fall into deflector spout R, which throws them into pocket S, and they are then easily taken away from the machine. This is doubtless the most perfect manner in which castings of any kind are made, and it shows the hight of the development of the die-casting process and the perfection that has been reached in casting methods. With it more castings can be made in a day and the losses from bad castings are lower than with any other method that has been devised for casting metals. In addition to that, the castings are made with an absolutely smooth outer surface and the necessity of machining in any of the various ways is done away with. Castings that go to make up the moving, as well as stationary, parts of various machines and instruments are taken directly from the casting machine and assembled in their respective places.

A horizontal machine of this same type, fastens one half of the die-mold to the nozzle and locates the other half on a carriage that slides back and forth. Thus, the back half is drawn away from the forward half to eject the casting, the vacuum is established by two tanks, in which a continuous vacuum is maintained, located on each side of the mold. When the half mold moves to the closed position, connections are made to these vacuum tanks and the air is sucked out of the cavity of the die-mold. The exact form of the machine is immaterial as long as the vacuum is successfully created in the casting machine.

Still another form of die-casting machine that removes the air from the mold before filling it with molten metal is shown in Fig. 7. This is a hand-operated machine conconnected to an air pipe at F. It does not produce so good castings as the machine shown in Fig. 6, but is being successfully used in the manufacture of die-castings. The two halves of the mold are drawn apart by raising lever D. Then a ladle, like that shown at A, is filled with metal at an ordinary melting furnace and placed inside of a cavity above the die-mold. Lever D is then brought down to close the mold. After that, a valve is opened that takes the air from the mold through outlet C and pipe F, and the ladle full of metal is then turned upside down. Compressed air is next turned on by opening valve B and the metal that has been dumped out of ladle A is forced into the casting cavity at H, by this incoming current of air. The mold is then opened and lever I is pushed in to force the casting out of the mold, with ejector rods E. This is the only machine that uses suction to draw the air out in combination with compression to force the metal into the mold. As this machine is only hand-operated, it is much slower than the machine shown in Fig. 6, and the incomgases and entirely overcome any good effects that might be given the metal by the partial vacuum in the mold.

With any of these die-casting machines, it is not possible to cast metals having a melting point that is over 1200 deg. Fahr. This is largely due to the fact that no metal or material has been found that will withstand the action of any higher temperature and at the same time have wearing qualities that will enable one die-mold to make enough castings to be commercially successful. Consequently, castings with the strength of the bronzes and steels cannot be obtained in die-castings. Die-castings, therefore, are always made from the low melting, white metal alloys, and the yellow metals or any of the iron products cannot be successfully manufactured into castings in this way. The white metal alloys, however, can be made with a strength that is equal to yellow brass castings and where such strength or wearing qualities will suffice, no better or cheaper method has been devised for manufacturing castings that will do away with machine work.

Parts that can be gotten into shape by the punch press or similar methods are much cheaper than those die-casted Many intricate pieces, however, that cannot be punched out and would necessitate machining, if cast in sand molds, or forged, are much cheaper when made by the die-casting process. The thing that has made it possible to manufacture die-castings of the strength of yellow brass is the application of the vacuum principle to die-casting machines. To construct a die-casting machine and molds that will stand a high enough pressure on the incoming metals to make dense, sound and strong castings would be very expensive, but by adapting the vacuum principle to these machines, this has been accomplished at a cost that is not prohibitive.

All kinds of castings are made so much better by casting them *in vacuo*, as well as by melting the metals in a vacuum, that this principle is bound to increase in commercial use and doubtless vacuum castings will become more commonly made and used in the future. Improvements will probably be made in the methods of casting sand molds in a vacuum that will make these cheap enough to be a commercial success, and where any kind of a permanent mold can be used, castings for machine parts or for various kinds of apparatus and instruments can be profitably made in a vacuum.

The Philadelphia Foundrymen's Association

The regular monthly meeting of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club, in that city, on the evening of January 3, marked the twentieth annual meeting of the organization. H. L. Haldeman presided. The election of officers for the current year was held, resulting as follows: Thomas Devlin, Thomas Devlin Mfg. Company, president; Elmer E. Brown, E. E. Brown & Co., vice-president; Josiah Thompson, J. Thompson & Co., treasurer; Howard Evans, J. W. Paxson Company, secretary. Executive Committee—Walter Wood, R. D. Wood & Co.; Thomas M. Eynon, Eynon-Evans Mfg. Company; H. L. Haldeman, Pulaski Iron Company; Walter T. MacDonald, Schaum & Uhlinger, and Walter S. Bickley, Penn Steel Casting & Machine Company, Chester, Pa. Trustees—Thomas Devlin, Josiah Thompson and Howard Evans. Official chemist, George C. Davis.

H. Caird, chief electrical engineer Excello Arc Lamp Company, New York and Philadelphia, made an address on "Foundry Illumination with Reference to the Flaming Arc Lamps." He illustrated points in connection with his subject by elaborate blackboard sketches and made practical demonstrations with an Excello flaming arc lamp. He outlined the many advantages of flaming arc lighting in general foundries and machine shops and gave a brief history of the development of the various types of flaming lamps. Comparisons were made between the "clock-work" type and those involving other principles. Over 200,000 Excello flaming arc lamps have been installed in this country, he said, which have had a record of not having given any calls for trouble since their installation.

Following adjournment an elaborate luncheon was served in the club dining-room, after which Secretary Evans related some of the incidents in connection with the formation of the association. Josiah Thompson, one of the originators of the association; H. L. Haldeman, Arthur Simonson and others made brief addresses.

New 32-In. Gear Turning Lathe

For finishing steel gear blanks and also cast-iron ones, at increased speeds and feeds, the Cincinnati Pulley Machinery Company, Cincinnati, Ohio, has brought out a 32-in. gear turning lathe. The tool is heavily built and construction is rigid throughout, which enables the heaviest cuts of high-speed tools to be taken. Front and rear views of the machine are given in Figs. 1 and 2, respectively.

Two independent tool slides are provided, one at the front and the other at the rear of the machine. These slides are mounted on rails, which are bolted to extensions on each side of the bed. The slide on one side of the machine has a power longitudinal feed, and the other has a power cross feed, an arrangement which enables three cuts to be taken simultaneously. Both slides also have cross and longitudinal hand adjustments. The drive is of the belt type, power being transmitted from the countershaft to the two-step cone pulley located at the right end of the machine, as shown in Fig. 1. A train of large spur gearing having a ratio of 26 to 1 transmits power from the driving pulley to the spindle, which has four speeds, ranging from 9 to 16.5 r.p.m. The speed variation is secured by a two-speed countershaft and a two-step cone pulley. The spindle, which is 7 in. in diameter, is made of hardened crucible steel and is bored its entire length. The steel main spindle driving gear is inclosed. The face of this gear is 4 in. wide and the pitch is 4.

The feeding movement is derived from the cone pulley shaft through spur gearing, which drives the feed shaft, as illustrated in Fig. 2. The feed shaft actuates the longitudinal slide above it, and the clutch lever and the clutch, shown to the right, are used to engage and disengage the feed. The three-step cone pulleys, at the right end of Fig. 2, have a belt running over them, which provides the connection to the opposite side of the machine. The feed transmission for the slide having the power cross feed is clearly indicated in Fig. 1.

The following table gives the principal dimensions and specifications of the machine:

Swing of lathe, in.	32
Maximum longitudinal feed, in.	1/16
Number of spindle speeds	4
Minimum spindle speed, r. p. m.	9
Maximum spindle speed, r. p. m.	16.5
Ratio of spindle driving gear	6 to 1
Number of longitudinal feed changes	3

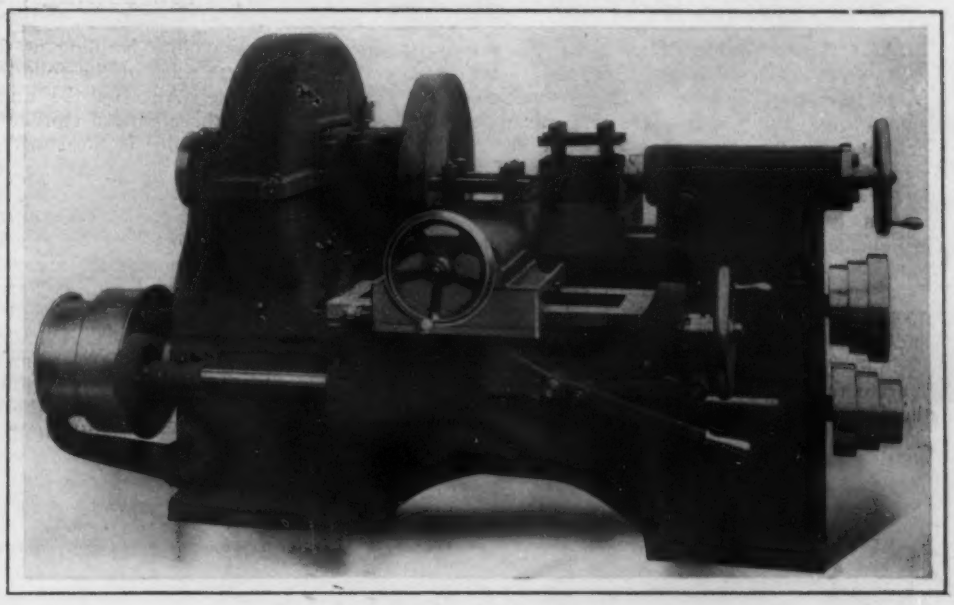


Fig. 2—Rear View of the Lathe

Minimum longitudinal feed, in.	1/32
Maximum longitudinal feed, in.	1/16
Minimum cross feed, in.	0.018
Maximum cross feed, in.	0.036
Minimum countershaft speed, r. p. m.	290
Maximum countershaft speed, r. p. m.	350
Diameter of countershaft pulleys, in.	20
Face width of countershaft pulleys, in.	6
Width of driving belt, in.	5
Weight of machine, lb.	6,500

All the worms and worm wheels operating the feeding mechanism, as well as all the pinions, are of steel and are entirely incased to protect them from dirt and chips.

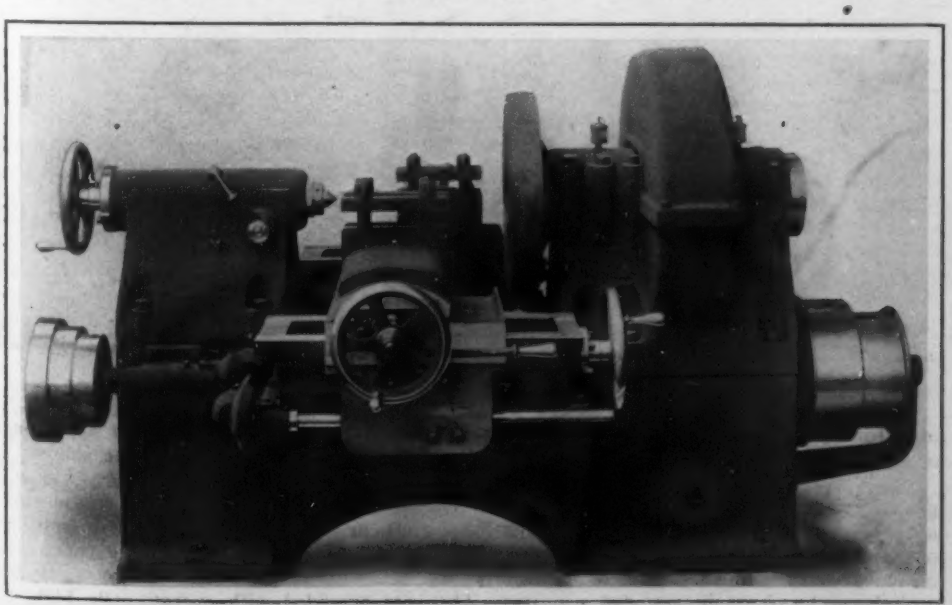


Fig. 1—Front View of a New 32-In. Gear Turning Lathe Built by the Cincinnati Pulley Machinery Company, Cincinnati, Ohio.

Work on the new building of the David Ranken School of Mechanical Trades at St. Louis, Mo., which is to cost about $300,000 and will triple the present capacity of the school, has been begun. The building will be of brick and granite and will be in three sections, respectively 83 x 193 ft., 49 x 113 ft. and 49 x 113 ft., all three stories. It will be equipped for the executive offices and the bricklaying, carpentry, plumbing and machine shops. It will also contain the gymnasium and baths, there being 38 rooms in all in the structure.

The Geo. E. Cutter Company, South Bend, Ind., has absorbed the Lang Electric Company, Chicago, manufacturer of switchboards and electric appliances of a general character. The officers elected following the merger are: Warren Ripple, secretary and treasurer. The Messrs. Ripple were officers of the Lang Company, and Mr. Cutter, who was president of the Cutter Company, will represent the company in the East. The principal office remains at South Bend for the present.

Plant of the Best Manufacturing Company

Solutions of the Problems of Building Arrangement and Equipment at Oakmont, Pa., for Orderly and Economical Making of Valves, Pipe Fittings, Etc.

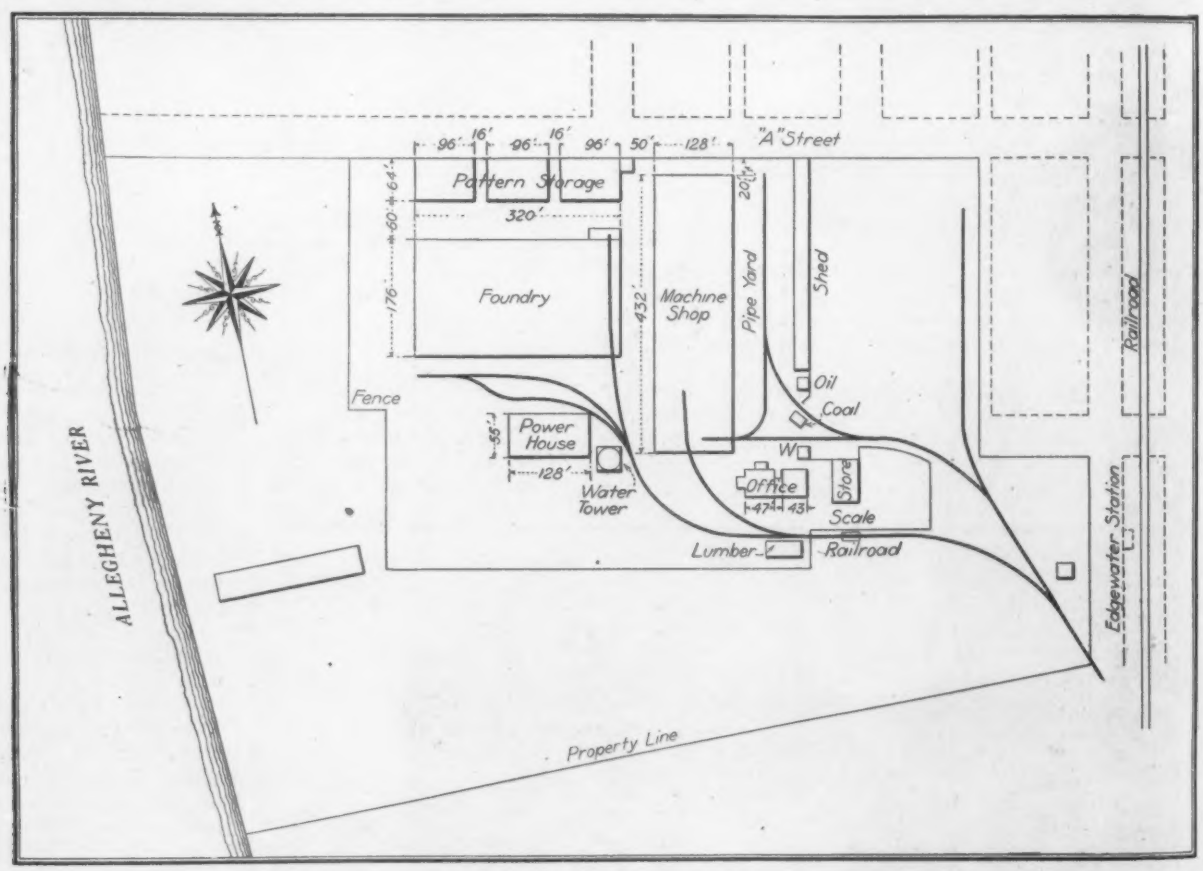
At Oakmont, some 12 miles up the Allegheny River from Pittsburgh, is located the new plant of the Best Mfg. Company, devoted to the manufacture of valves, pipe fittings, pipe bends and special castings. The ground occupied by the plant lies between the tracks of the Pennsylvania Railroad and the bank of the Allegheny River and is served by a spur track and by its own special station, Edgewater. The property owned by the company is indicated in the accompanying block plan. At the present time the part enclosed by the fence is in use, as well as a section to the north of A street, where a group of houses has been built for the workmen and a rest house and athletic field has been provided.

Materials come in and finished products go out over the spur to the railroad, the terminals entering the pipe yard, the foundry stock yard, the machine shop and the foundry, as shown. From the foundry stock yard, the raw materials, such as coke, pig iron and limestone, pass to the charging elevators for the cupolas which are located about the center of the foundry. Lumber for patterns, after storage in the shed provided for that purpose until it is partially seasoned, is passed to the drying kiln for completing the process.

All parts of the plant proper are established well above high water mark. The property outside the fence, however, is at a lower elevation, affording a place for the disposal of foundry refuse for many years to come. Besides the main switch tracks, an industrial railway is provided for the handling of heavy material on truck cars, and this, supplemented by plentiful provision of cranes, enables the handling of heavy pieces quickly and at a minimum of expense.

As seen from the general plan of the plant, the main buildings are the machine shop and the foundry, which are placed at right angles to each other. At the east side of the machine shop is the pipe yard and pipe storage shed with the office building at the south end. On the north and west sides of the foundry is the yard for the storage of flasks. Also on the north side of the foundry are located three pattern storage buildings. On the south side of the foundry is the stock yard for storage of raw material, with the power house beyond. The lumber shed is located southeast of the machine shop, and to the east of the building is located a small storage building for supplies and tools.

It is seen that the arrangement is thus convenient for the handling of work. Patterns and flasks come to the foundry from the side next the molding floor, while the stock for the cupolas is located on the side of the foundry nearest them. The cleaning room for castings is in the end of the foundry next the machine shop, and the castings are taken direct to the main bay of the shop, where they are stored until needed for machining, or to the casting storage section in one corner of the shop. Cars are shunted about the plant as may be needed and are loaded in the machine shop or foundry by overhead traveling cranes. The size of the plant can be apprehended by the following enumeration. The machine shop is 432 ft. in length by 128 ft. in width; the foundry 320 ft. in length by 176 ft. in width, and the power house 128 ft. in length by 55 ft. in width. Machine shop, foundry and power house are all of modern steel frame construction with brick curtain walls and cement tile roofs on steel trusses. They are provided with exceptionally high windows.



General Arrangement of the Works of the Best Mfg. Company at Oakmont, Pa.

Foundry

At the north side of the grounds are three corrugated steel pattern sheds, each having three floors, for the storage of patterns. The lower floor is arranged for the heavier patterns and above are racks, three shelves to a rack, all lettered and numbered, and with patterns ar-

ranged according to size and each one card indexed so that its position can be specified on any job ticket. The distance from the pattern shed to the foundry is comparatively short, 60 ft., and between the foundry and these sheds is the flask storage yard with industrial tracks leading from the yard into the foundry and turntables allowing any flask or pattern to be transferred easily and quickly to any part of the foundry.

The foundry is arranged in three bays, that on the north side being devoted to the cleaning of castings, the repair and alterations of flasks and the molding of the smaller patterns. In the center bay is the location of the floor molds, where large pieces are cast, and in the south bay is found at the west end a space for small valve castings; in the middle, the cupolas, and at the east end, the core room. On the mezzanine floor back of the cupola is the chemist's laboratory. On the second floor is the charging platform, and west of this is located the brass foundry.

Molding machines are used wherever they are thought to be of advantage. Metal flasks are provided, specially shaped to the patterns for standard work, with metal core boxes for the smaller work. Of the installation, that in the core room is a 5-ton girder crane, made by the Morgan Engineering Company, while over the pit and loam floor are a 15-ton and a 30-ton girder crane of the same make. Along the side of this floor next the cupolas are two 5-ton jib traveling cranes to serve the ladles and handle the lighter local traffic. Over the north bay are a 10-ton Morgan and a 10-ton Whiting crane.

In the floor molding for large special castings the lower half is molded in the floor, while a flask is used for the top half. Loam, molds and swept-up forms are used for large pipe and other castings, this work all being done in the center bay, and being of necessity hand work, since no two pieces are alike. In the north bay are made the molds for the smaller castings and standard fittings. Tabor compression machines, rollover machines and jarring machines are all in use with standard patterns, flasks and facing boards, to secure rapidity and accuracy. Flasks are shaped specially to fit the patterns in order to give a firmer mold to save in the amount of sand needed.

The flask altering shop at the west end of the north bay is provided with a swing cut-off saw, a rip saw and a drill press, each driven by an individual motor. At the east end of the north bay castings are cleaned by means of hand work, pneumatic chipping hammers, tumbling barrels and the sand blast.

The two cupolas in the south bay have capacities of 12 and 30 tons per hour, and are charged from a second-story floor served by a hydraulic plunger elevator. On this floor is also located the brass foundry, where castings are made for small valves and the brass parts of the large valves, also Monel metal castings. Schwartz furnaces are used here, supplied with oil fuel and air blast and arranged like Bessemer steel converters, to tilt and deliver their charges into the ladles.

Between the cupolas and the core room are three large core ovens which are shown in an accompanying drawing. These are heated by natural gas with an arrangement for coke firing if necessary and are served by the 5-ton crane which runs over the core bay. The trucks from the ovens can, however, be run out far enough to reach under the cranes in the main bay. In the manufacture of the "Best" products the core oven is an important feature. For some of the smaller castings a green sand core is used, but for the complicated shapes and for all of the larger work, the core must be carefully baked to obtain the right degree of hardness.

Machine Shop

The location and dimensions of the machine shop are shown on the block plan. The part to the north of the dotted line is used for machining operations and that to the south for pipe bending and peening. Material comes in from the foundry and is deposited in the storage space for castings, either in the middle bay or in the northwest corner. Flanges travel along the north end of the shop, first to the boring and tapping machines, then to the facing lathes, then to the drill presses and on to stock. Large fittings and valves and special castings are taken care of on the boring mills, planers and lathes. Small valve bodies are machined on turret lathes next to the boring mills.

Smaller parts and fittings are taken care of on the lathes on the east side of the shop. All valves are assembled on the fitting floor in the northeast corner. From here they are taken to the testing press and then go to storage, the larger valves on the stock space on the floor and the smaller ones in the stock bins in the gallery.

Electric drive is used throughout, the larger tools having individual motors and the smaller ones being driven in gangs from counter-shafting. The main shafts and the counter-shaftings are supported from the steel columns and arranged to permit of belt driving to both main and side bays easily. Some of the tools in the equipment are a large open-side planer, a vertical and a horizontal boring mill, a bank of smaller boring mills, turret lathes and ordinary lathes, large and small tapping machines, double-head facing lathes, multiple-spindle drills, single drills, a gang of pipe threading machines, and other special tools.

The lathes are of various makes, some from the New Haven Mfg. Company, some from the Pond Machine Tool Works, and some from the R. K. LeBlond Machine Company. Small boring mills are of the make of the Betts Machine Company; multi-spindle drills from Manning, Maxwell & Moore; tapping machines from Baker Brothers; drill presses from the Niles-Bement-Pond Company and from the works of Prentice Brothers Company, and radial drills from the Prentice Brothers and from the Niles-Bement-Pond works at Ridgway, Pa. The big boring mills and the planer are from the Niles Tool Works, and the open-side planer from the Detrick & Harvey Company.

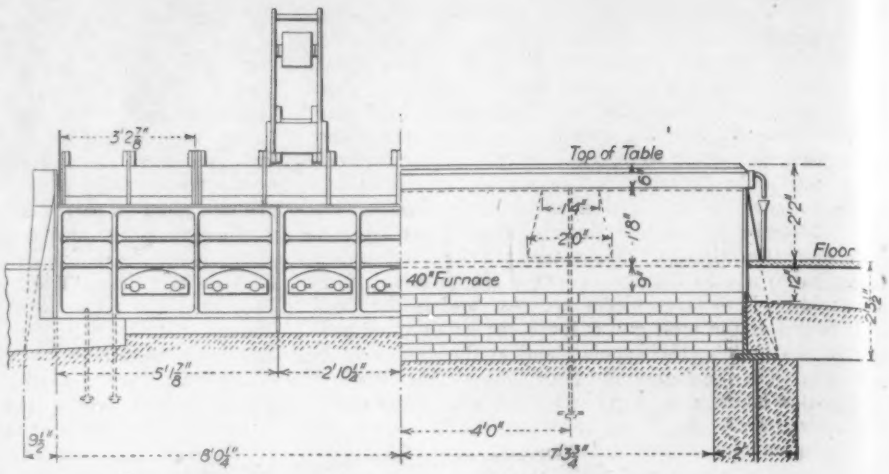
Pipe Yard Alongside Machine Shop

Particularly interesting are the jib cranes, supplied with a 2-ton electric hoist, made by the Shepard Electric Crane & Hoist Company. One of these cranes is supplied to serve each of the larger tools, and one for two or more of the smaller tools. A 3-ton girder crane also runs over the assembling and small lathe department in the north end of the east bay. The main bay is served by a 5-ton, a 10-ton, and a 15-ton Morgan electric overhead traveling crane. The pipe shop has a 15-ton crane of the same make and description.

Above the cranes is a row of flaming arcs for general illumination for the main bay. At each individual tool is an incandescent lamp on a flexible cord and a support of pipe or iron rod which can be moved to bring the light to any position desired, or the lamp can easily be taken off and held by hand for closer inspection. The combination has proved effective.

Hydraulic pressure for testing purposes is obtained up to 800 lb. per square inch from the lines serving the elevators, and up to 1500 lb. from a Goulds' triplex pump provided especially for the purpose. Pressures up to 10,000 lb. are obtained by means of hand pumps of special design.

In the pipe shop at the south end of the building are carried on the operations of making pipe bends, attaching flanges to pipe by the Van Stone method and the shrinking and peening processes, as well as welding steel nozzles on pipe for headers. Pipe for bends is filled with sand by gravity from an overhead hopper. The ends are then plugged, the pipe is placed in the furnace and that portion which is to be bent is heated to the proper temperature. The pipe is then placed on the bending table, where, by means of an electric winch, it is bent around appropriately placed pins and forms, to give the exact curve and angle required. The purpose of the sand filling is to prevent the pipe from buckling while being bent, and after the bend is made the sand is emptied into a tank below floor level, from which it is blown upward to the gravity hopper.



Longitudinal Elevation and Section of the Pipe Bending Furnaces

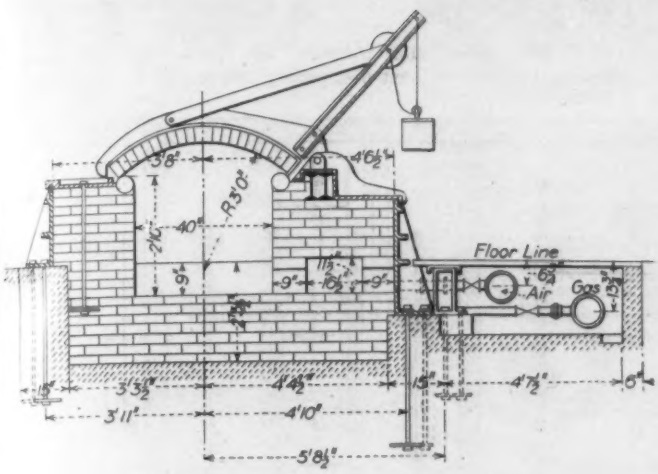
Nearby is located a smaller furnace where the ends of pipes are heated for receiving the Van Stone joints. When heated to the proper temperature, the pipe is clamped in a machine and the end rolled over at a right angle to the center line. After the other end is put through the same process of heating and rolling, the pipe is swung in a double head lathe and the roll-over or lap faced at exactly 90 degrees to the pipe. The lathe used in facing the Van Stone laps is 48 ft. between heads, so that it would be possible to face the flanges on a pipe or header of that length. As pipe may now be obtained in lengths of about 40 ft. and in sizes up to and including 12 in., a maximum elimination of joints in piping work is possible, especially in connection with welded headers.

Near the Van Stone machine is the welding department, which is principally occupied in attaching steel nozzles to pipe. The hole for the nozzle is cut out by the welding flame, and the nozzle fitted to conform to the surface of the pipe. The flame is then applied to the joint between the nozzle and the pipe, obtaining a smooth weld. The welded nozzles are commonly provided in constructing headers.

For the regular fittings solid wood patterns are used, pine being the material for special fittings and mahogany for the standard patterns up to 10 in. in diameter. The flanges are bound with brass and the facing plates have iron rims. For the standard patterns iron core boxes are used, and for sizes from ½ to 2½ in., for unions and other similar castings, metal patterns are made and generally used in gangs.

The pattern shop extends across the north end of the gallery and along the two sides about half the length of the shop. On each of the side galleries the machinery is

Looking North in the Machine Shop, Showing Hanger Supports for Shafting



Cross Section of the Pipe Bending Furnaces

installed in duplicate so that the workmen do not have to go far from any bench position to get a tool for sawing, planing or other operation. In the east gallery there is also a dry kiln for seasoning the lumber by the carload after it has had a session in the outdoor seasoning shed.

Band saws furnished by the Atlantic Works, Inc., a Watkins woodworker, which is an imported machine, capable of cutting patterns of almost any shape, and a full equipment of wood working machinery furnished by the Oliver Machine Company, form the working installation of the pattern shop. It includes lathes, trimmers, joiners, combination rip and cutting off saws, surfacers, sanders and special tools. A convenient outfit for the pattern shop is the Universal grinder made by the Mummert, Wolf & Dixon Company. This grinds with coarse and fine emery and is capable of putting an edge on circular or flat tools, either exterior or interior. The larger tools are driven by individual motors, and the smaller ones by the grouping system from a counter-shaft.

Lighting is here accomplished by the use of Nernst lamps hung overhead, giving illumination without special lamps for benches or tools. Beyond the dry kiln in the gallery is storage for finished parts and small fittings, which are taken care of in racks and piles until needed.

In the west gallery is located the tool room, where tools are made, repaired and stored. The tools are kept in labeled compartments. The equipment consists principally of the following: Two speed drills made by the Niles-Bement-Pond Company, Warner & Swasey lathes, Brown & Sharpe grinder and shaper, two Hendey Machine Company lathes, two lathes from R. K. Le Blond Machine Tool Company, two Prentice Brothers drills, milling machines made by the Le Blond Company and Cincinnati Milling Machine Company, shapers made by the Niles-Bement-Pond Company and Gould & Eberhardt, a radial drill from the Foster & Holloway Machine Tool Company, and a hollow center lathe made by the Acme Machinery Company. All are arranged with generous working space around them and are provided with overhead lighting by the lamps, but daylight has proved ample except during the dark hours and on cloudy days.

South of the tool room is found the brass working department, devoted to the machining of unions, small valves, and of brass parts entering into the construction of the large iron and steel valves. The equipment of this department consists largely of turret lathes made by the Warner & Swasey Company, the American Tool & Machine Company and Lodge & Shipley. An interesting process is the making of brass seat rings for gate valves from a single brass tube by a continuous process. The tube revolves without stopping, while by means of turret head tools and cutters the seat rings are turned, threaded and cut off as fast as the cutting speed of brass will allow.

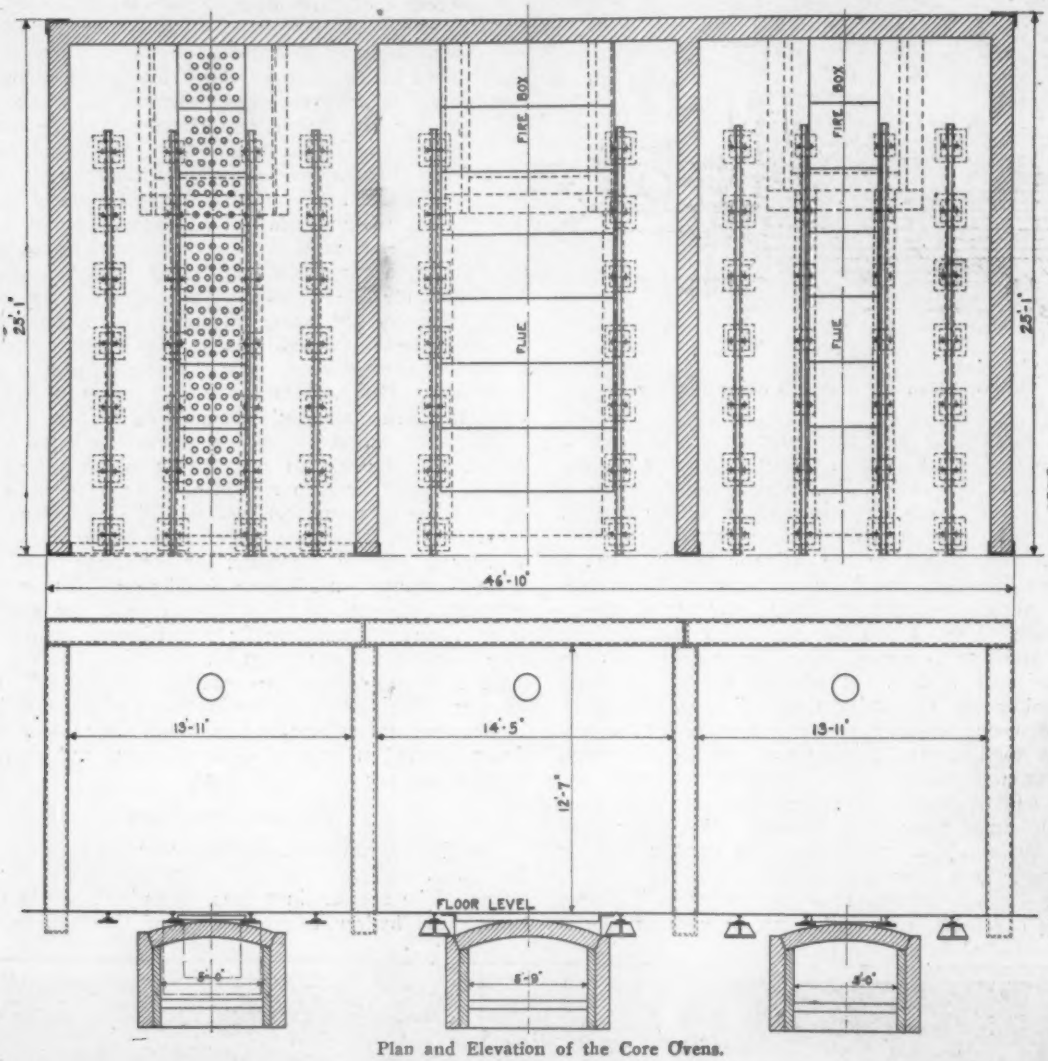
Between the gallery and the main floor are mezzanine floors, located at each of four elevators and stairs, with modern sanitary toilet provisions.

Product of the Plant

Besides special castings on order the output of the Best Mfg. Company's works is largely material for power plants. The special lines are: Standard, medium, extra heavy, and hydraulic gate valves of the company's own

View in the Foundry Before Completion Showing the Cranes

design; standard, medium, extra heavy and hydraulic fittings; special fittings of any design; pipe bends of any size or angle; large pipe fitted with special flanges, either Van Stone, peened or welded; special headers with nozzles welded on, the number, size and position of the nozzles being limited only by the area of the header surface to which they are to be attached.



Plan and Elevation of the Core Ovens.

The Pollak Steel Company's Axles and Forgings

The Pollak Steel Company, successor to the Block-Pollak Iron Company, Cincinnati, Ohio, has issued a circular letter giving a description of its special heat-treated railroad axles and forgings. The company states that, after much experimenting and careful study, taking into consideration the requisites of uniformity of material, high tensile strength, high elastic limit, degree of hardness for wearing purposes, durability, economy of material and factor of safety, a method of manufacturing has been evolved which has met with the most satisfactory results.

The Pollak process starts with the manufacture of the axles and forgings under a steam hammer and from square open-hearth billets. It avoids the practice of rerolling billets in round form to the largest diameter of the proposed axle, and then simply stamping the smaller parts under a hammer, as in that event the axle or forging would not receive sufficient work to insure the complete transformation of the fiber of the steel. By the process used, the billets are forged down to the size called for on the blue print, eliminating the rerolling completely.

To overcome the uneven cooling of the billet while being thus worked, and to relieve the strains and stresses then found in the steel, the Pollak special heat treatment process has been evolved, by which the axles and forgings are annealed at such temperature that the fiber is heated uniformly and the strains due to cooling are no longer present. This temperature is determined by the use of a pyrometer for the purpose of securing exact results. Specially designed furnaces and oil baths have been built in connection with this process. A specially prepared bath is provided in which the axles and forgings are quenched, this bath having the proper heat-dissipating powers to regulate and hold the steel at the required point which will give the results sought for in the specifications. To refine the grain still further and insure complete control of the properties desired, a re-annealing takes place at a lower temperature. It has also been found that specially prepared oil, which the company is using, hardens the shell of the axle or forging, thereby decreasing its liability to wear and thus making it more durable while insuring greater safety and greater strength.

Further Scullin-Gallagher Company Improvements

Harry Scullin, president of the Scullin-Gallagher Iron & Steel Company, St. Louis, manufacturer of open-hearth steel castings, entertained 30 of the heads of departments of the company at dinner Saturday evening, January 6. The dinner was in recognition of the service rendered by all employees in 1911, and especially for the showing in December, when a new record was made for low cost of production and for tonnage in plant No. 2. In addition to the improvements recently mentioned the company has just contracted for a 45-ton pouring crane from the Alliance Machine Company and a turbine air compressor from the Ingersoll-Rand Company to use exhaust steam capable of throwing 4000 cu. ft. of air per minute at 100 lb. pressure. This will be the first installation of a machine of this kind in this country.

A Clifton Forge, Va., dispatch says that the Goshen Iron Company, which has operated the Victoria furnace at Goshen, Va., and the Rich Patch iron mines near Clifton Forge, was put in the hands of C. M. Shanahan as receiver December 30.

New Henry & Wright Drilling Machines

Recently the Henry & Wright Mfg. Company, Hartford, Conn., has added a new type of multiple-spindle drilling machine to its line. A number of interesting improvements have been incorporated in the design, which is made in two styles, the class B, illustrated in Fig. 1, and the class C, which has a cabinet base and is shown in Fig. 2.

A new design has been employed in the construction of the spindle arms, which makes use of a very simple and yet nevertheless strong, clamping device. The clamping levers for the arms are located on the left side, instead of the right as formerly, this change having been made so that the workman could employ both hands to the best advantage in raising and lowering the arm. A considerable increase has been made in the hight of the drilling head, and the base was lowered a corresponding amount to produce a stiffer and more convenient design. For raising and lowering the table a hand wheel is regularly employed, but, if desired, a crank such as the one shown in Fig. 1 can be furnished when specially ordered. The pulley on the rear shaft is fitted with a spring locking device, which enables it to be adjusted from the front of the machine when changing speeds without the use of a wrench. The belt-shifting device is entirely new and permits the belt shifter proper to be set at any angle. The base of the machine has an oil groove and either a plain table or one having an oil groove can be supplied. The stop on the machine is applied to the rack, instead of at the top of the spindle as formerly.

Hand wheels located near the spindle driving pulleys enable the tension of the driving belt to be controlled from the front of the machine. The spindle pulleys are supported at the top and the bottom, instead of at the bottom only, and the spindles are driven by a new balanced drive, which consists of two hardened steel rollers set in a diametrically opposite vertical position. These rollers are loosely fitted halfway into grooves in the spindle, so that they bear at the nearest possible point at the outside of the spindle, and furnish a drive which is not only almost frictionless, but at the same time is very powerful. Another advantage of this drive is that it can be located underneath the spindle pulley, instead of on top as formerly, and this arrangement results in the use of a much shorter spindle, which reduces the tendency of vibration when the spindle is raised to its highest point. The spindle is said to be much stiffer for a given traverse.

The machine illustrated in Fig. 2, which is designated by the maker as the class C machine, is similar to the class B one illustrated in Fig. 1, with the exception of the base and the table. In the former machine the base is of the cabinet type, and the table is attached to the base by four screws, which can be easily removed for replaning when that is necessary. This machine has been designed for use where extreme stiffness and accuracy are desired.

When so ordered, both of these machines are supplied with lubricating equipment, and in the case of the class C, or cabinet base design, the oil tank is located inside the base and is connected with the table by four oil ducts leading from the centers of the four sides of the table.

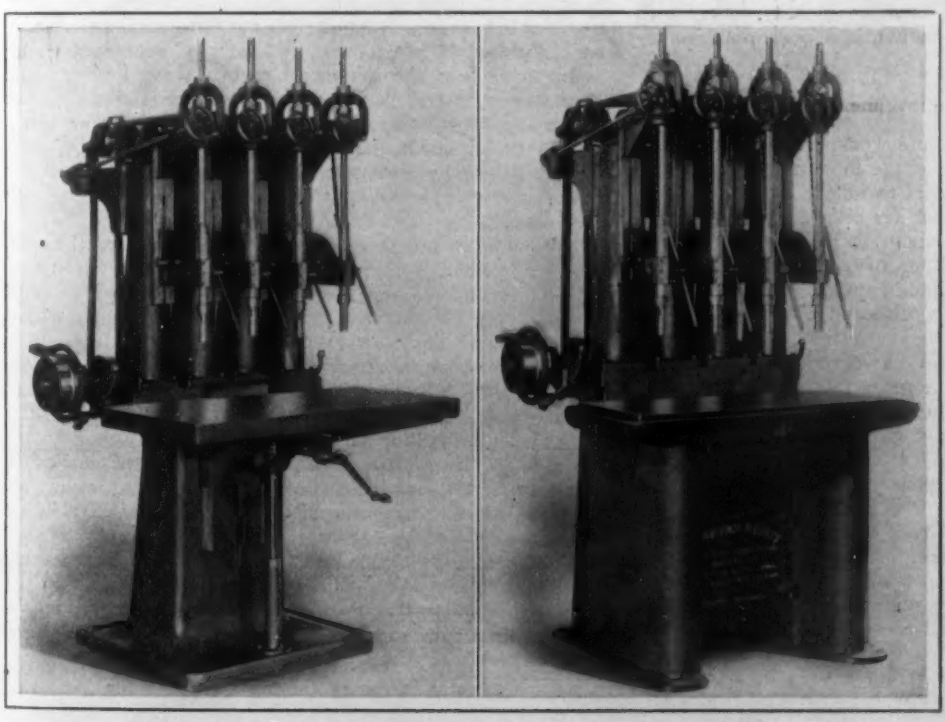


Fig. 1—The Class B Machine Fig. 2—The Class C Machine
Two New Types of Drilling Machine Built by the Henry & Wright Mfg. Company, Hartford, Conn.

German Productive Expansion

Under date of December 21 our Berlin correspondent furnishes the following information regarding the expansion of productive capacity in Germany:

In addition to new expansion plans recently reported in this correspondence other such cases are daily coming into view. The plans of the Gutehoffnungs-Hütte embrace modern blast furnaces of large capacity, a steel plant and rolling mills. Land extending some three miles along the railroad near Diedenhofen, on the line between Metz and Luxemburg, has been bought, and work will be commenced next spring. The owners, the powerful Haniel family, have unusually rich ore properties in that region.

A company has been organized at Lübeck to build and operate a steel plant and rolling mill, to run chiefly on thin plates, in connection with the furnace company which began operations there several years ago. This latter concern has just arranged to absorb the Bergischer Hüttenverein, at Hochdahl, near Düsseldorf. The Lübeck Company will increase its capital for this purpose, and will also erect a third blast furnace as well as a cement mill.

Several amalgamations are also just completed or about to be completed, which will lead to further expansion of production. A fusion of the Aplerbecker-Hütte with the Langendreer wire works (Westfälische Eisen und Drahtwerke) was voted yesterday. The Aplerbecker concern is a furnace plant, which has been losing ground in competition with the big mixed concerns. It is understood that the wire company is planning to develop it and add a steel plant and rolling mill, where its wire rods will be rolled. The Felton & Guilleaume Company, at Mühlheim on the Rhine, which is now owned by the Allgemeine Elektricitäts-Gesellschaft, of Berlin, has also just arranged to absorb the Collart furnace plant in Luxemburg, with the intention of adding a steel plant and rolling mill. The projected annexation of the Mannstaedt bar mill and the Düsseldorf wire mill by the Aumetz-Friede Company, of Lorraine, already mentioned in this correspondence, was accepted by the stockholders of all three companies last week. The last named company is also acquiring another coal mine.

A deputation representing the iron and steel industry of Canada waited on the Dominion Government January 5 and held a protracted conference. There were present J. H. Plummer, head of the Dominion Iron & Steel Company; Mr. Hobson, for the Hamilton Iron & Steel Company, and Thomas J. and George E. Hammond for the Algoma Steel Company.

Improvement in the Quality of American Steel

A Great Advance in Steel Rails, but the Service Demands Have Increased in Greater Proportion — Practice at South Chicago

BY T. W. ROBINSON*

The excellent summation Mr. Robinson gives of the steel rail situation, in respect to the quality of present-day product, is in response to the letter which was addressed by *The Iron Age* to the various steel companies, and to which reference has already been made, a number of replies appearing in our issue of January 4. The article below deals generally with the efforts of American steel manufacturers to improve quality, but more particularly with what has been done at rail mills, as exemplified in the practice at South Chicago.—EDITOR.

The average quality of American steel has never been so high as it is to-day. This fact is not so much because better steel than formerly is being made in our Bessemer converters and open-hearth furnaces, but because relatively less poor steel is being made and because our present knowledge permits of a more intelligent elimination of imperfect material. High output is not inconsistent with high quality, and in respect to the relative merits of the average product of the American and foreign steel manufacturers America does not suffer, and has not for many years suffered, by intelligent comparison. Such adverse criticism as exists is largely the heritage of the earlier controversy over the intensity of American practice, the elements of which have been widely adopted by some of our former critics. The fact is that output is but a relative and ever-changing term, and has been increased largely as the result of mechanical improvement, and is but little concerned with metallurgical change. Quality, either with high production or low production, is a question of management, not capacity.

A Progressive Improvement in Steel

There has been a gradual and world-wide improvement in quality since the inception of the modern steel industry. The effort of the last few years to improve the quality of Bessemer and open-hearth steel has been quite largely centered in the development of alloy steels. Nickel, chrome, titanium, manganese and some of the rarer elements, especially vanadium, are capable of imparting special qualities, and this has opened up a wide range of special steels for special requirements.

A better understanding, too, has been had both in alloy and ordinary carbon steels in respect to molecular structure, and the important influence of heat treatment upon molecular change is properly receiving more and more attention. Heat treatment is a field in which much of value has been done, and in which much more of practical value will be done.

The art of steel making is a progressive science, but it is by no means an exact science. We know that two pieces of steel similar in chemical composition, as ordinarily determined, may be entirely dissimilar in their physical character. We know that different steels which have the same physical attributes, as measured by our testing machines, may show entirely different results in actual service. A tenacity and ductility suitable for the static stresses of a given load may fail when subjected to the dynamic stresses of an apparently smaller load. We know, moreover, that a piece of steel which may be the same throughout in its chemical and physical character, as ordinarily measured, may differ widely in its microscopic structure, and may thereby give irregular results in actual service. Because our laboratories have their limitations, it has largely remained for experience in service to establish the difference in the normal quality of Bessemer, open hearth and crucible steel—a differentiation which our ordinary physical and chemical analyses largely fail to determine. These facts are offered not in depreciation of the inestimable value of laboratory work, but are cited to emphasize the necessity of using extreme care in the interpretation of laboratory results. It is clear, therefore, that the best test of the quality and character of any metal must be the final test of actual service.

*First vice-president Illinois Steel Company, Chicago, Ill.

Steel Rail Requirements

Perhaps there is no steel product upon which the demands have been more insistent nor the requirements more rightfully exacting than the steel rail. Its manufacture embodies in a marked manner the refinements of steel practice, and toward the accomplishment of the highest quality there exists the hearty co-operation of both the railroad and the steel manufacturer. As illustrative of some of the efforts toward that end, it is interesting to recall that one of the earliest metallographic laboratories of the country was installed over twenty years ago at the South Chicago works of the Illinois Steel Company, and from the research there instituted has come much of our present valuable knowledge of the microstructure of rail steel. There, too, was established at about the same time one of the earliest drop-testing machines, and the present drop test, now an important element in rail specifications, has been inaugurated largely from the results thus obtained. Since an early day the phenomena and laws of segregation and piping have been the subject of careful study by our steel laboratories, and the effect of heat treatment as a possible means of improvement is, and has been for some time, closely under investigation. Recently some of the rail manufacturers have installed large rail-testing machines of the revolving type for approximating the wear of the rail in service.

The modern rail specification has been evolved through the free exchange of information and ideas between the rail maker and the rail user. Rail inspection to-day calls for not only a rigid check upon the details of manipulation, chemical composition and finish, but also provides for the examination of the physical and internal structure of the rail. With a view of improving quality, open-hearth steel is being widely used. The peculiar properties of nickel as an alloy are being utilized, and the use of titanium is being given extensive trial. The remarkable combination of toughness and resistance to abrasion, so long recognized in manganese steel castings, has been lately emphasized by the successful rolling of manganese steel into rails. Electric steel, which has gone far toward the replacement of crucible steel because of its purity, density and comparative freedom from segregation, is being given a substantial demonstration in actual track service.

Greatly Increased Demands Upon Rails

The statement is sometimes made that the modern rail is inferior to those formerly made. It is true that there are failures in the modern rail, as there have always been failures since rails began to be used, but this fact does not warrant the statement that the modern rail is inferior. Rails are being made to-day under an enlightened knowledge of metallurgical practice and mechanical equipment. They are manufactured under more rigid and comprehensive specifications than ever before. If present rail specifications are inadequate, then they are so in spite of the co-operative effort of both the rail makers and the railroads to make the methods of manufacture fit the requirements.

The power of resistance of any steel to abrasion and impact is measured by its section, physical character and the duty it has to perform. It is clear that the larger the section the greater is the strength. It is also clear that the strength of the highest possible grade of steel is limited, and that the ever-changing track and train conditions must greatly affect the results of service. The standard

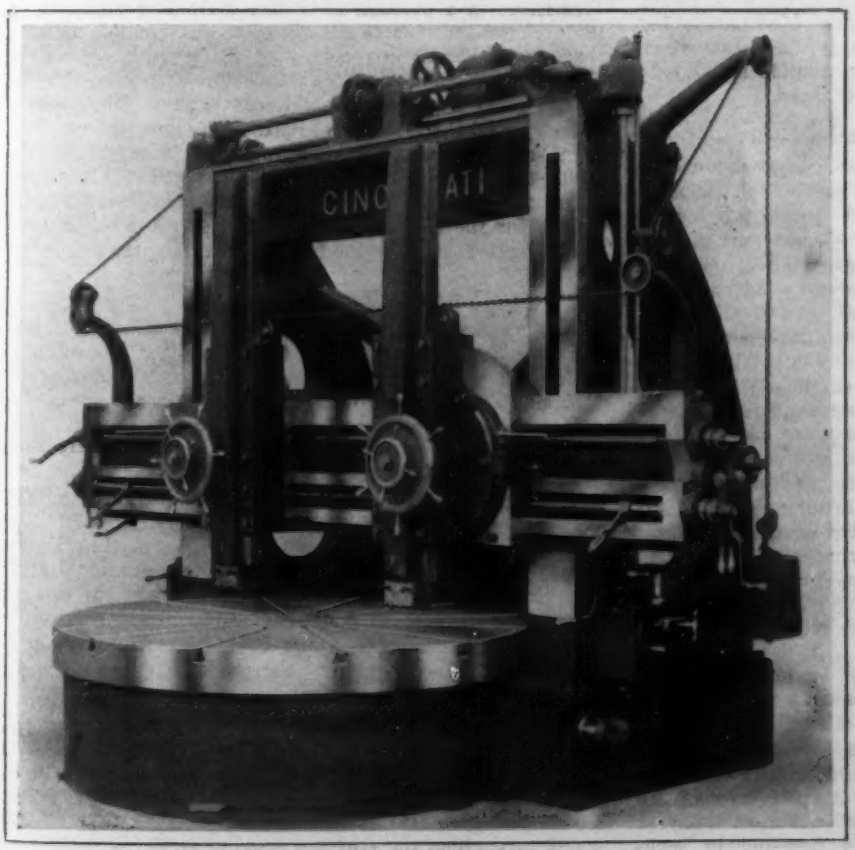
rail sections of to-day are more scientifically designed and give better results than the average section of earlier times. The steel going into our rails is unquestionably more uniform. The increased demands upon our rail, however, surpass our increased accomplishment in section and in quality.

In 1885, 65-lb. to 75-lb. rails were used in standard railroad construction. To-day 85-lb. rails are common, and 100-lb. rails practically represent the maximum weight in use. In 1885 the average driving wheel loads of the locomotive were less than 11,000 lb. To-day wheel loads of 30,000 lb. are common. That the density of traffic and the average weight of our cars and locomotives have largely increased is generally appreciated, but the combined and cumulative effect of increased load and modern high speed is not so well recognized. It is important to emphasize that under modern load and track conditions the static and dynamic fiber stresses in our rail, even in the largest sections, are much higher to-day than ever before. In view of this fact, as well as in recognition of the increasing demands, it behooves us to strengthen the rapidly vanishing factor of safety in our rails.

An 8-Ft. Cincinnati Boring Mill

About one year ago the Cincinnati Planer Company, Cincinnati, Ohio, began the construction of boring mills. Recently an 8-ft. mill, which is illustrated herewith, has been added to the line. In general the construction of this new tool is the same as that of its predecessor, the 10-ft. mill, which was illustrated in *The Iron Age*, January 26, 1911.

A deep box type of bed is employed and all parts are thoroughly ribbed and braced. The entire mechanism of the mill is supported on this bed so that no foundation outside of that for the base is required, an arrangement which it is emphasized, assures proper alignment of all the parts. The table, which is the full diameter of the mill, is supported on a broad annular bearing of large diameter that is lubricated automatically by rollers. As the oil pockets are filled and drained from the outside, it is possible to see that the table is being properly lubricated at all times. The center spindle, which is of massive construction, revolves in a bushed bearing having an adjustment for wear, while there is also a step bearing at the bottom that can be adjusted to vary the amount of load carried or raise the table for high-speed work. The main driving gear, which is cut from the solid, is of the internal type, and is said to make good tooth contact with the pinions, which are also solid steel forgings. The main driving gear is protected from dirt and chips, an arrangement which also eliminates all danger to the workman. To give a smooth motion to the table, all the pinions have a large number of teeth.



The New 8-Ft. Boring Mill Built by the Cincinnati Planer Company, Cincinnati, Ohio

Massive box construction is employed for the housings, a wide and long base assuring rigidity under severe duty. The regular top brace is made very large and heavy, while as an additional precaution an X brace, located at the back of the housings, is provided to take care of any side or twisting strain which might occur when heavy cuts are being taken with the cross rail at the maximum distance above the table. Any deflection of the cross rail due to the weight of the head or the pressure of the cuts, it is pointed out, has been reduced to a minimum by making that part of box form with a deep arch on the back. Clamps on the outside edge of the housings fasten the cross rail to the upright, while, to secure rigidity at its weakest point there are clamps which also act on the inside. A narrow guide bearing at the bottom of the rail is provided for the head, which prevents all tilting or binding while these parts are under cutting strain, as well as relieving the feed mechanism and insuring permanent alignment. It is emphasized that this construction results in smoother action than if there were only bearings at the top and the bottom. A rapid power traverse and hand adjustment through crank handles on the end of the rail are provided for both heads. These handles are also equipped with a safety lock, so that they cannot revolve when the rapid traverse is being used, and an additional adjustment is furnished by a ratchet on the rail screw, which can be moved to suit the convenience of the operator in making fine adjustments. Steel castings of large box section are used for the tool bars, which have a very long travel. Rapid power traverse in both directions is provided, and they can be raised or lowered by hand rapidly through a pinion and rack.

Fine tooth clutches, which take the place of friction clutches, are used to obtain the feed. Eight different feeds, ranging from 1/32 to 1 in., are provided, and these can be changed instantly by moving the lever at the side of the housings, where the feed box is located. Each head has an independent feed in all directions, an arrangement which is secured by the use of a separate feed box on each housing instead of a complicated arrangement on the back of the rail.

Either belt or motor drive can be furnished for the tool. With the former a four-step cone pulley is mounted on the top of the speed box. This gives 16 speed changes, and the power for raising and lowering the cross rail is taken directly from the countershaft. With the motor drive a 2-to-1 adjustable speed motor is used in connection with a speed box giving four mechanical changes. This motor can be set on the left side of the mill and belted to the speed box or can be placed on top and connected directly by gears. With the motor drive a small additional motor is required for raising and lowering the cross rail.

The furnace of the West End Furnace Company, Roanoke, Va., was blown in December 27.

British Iron and Metal Markets in 1911

An Upward Movement in Iron and Steel Late in the Year—Imports of American Semi-Finished Steel Much Increased

(Special Correspondence.)

LONDON, ENGLAND, January 2, 1912.—The year 1911 was a checkered one for the British metallurgical industries; but, though profits as a rule were hard to make, there was very little of which just complaint could be made on the score of business. The most remarkable feature of the year, indeed, has been the extraordinary activity of trade and the unremunerative character of selling prices over a wide range of products. To a large extent this has undoubtedly arisen from the policy of plant extensions inaugurated a few years ago and pushed forward with all rapidity, with a consequent need to-day of securing a much larger amount of business than formerly to keep plant running fully, and thus secure economical working conditions. The galvanized sheet trade is a notable case in point, while another illustration is furnished by the tinplate trade. In both of these industries the extension of productive capacity has been literally enormous; but, in spite of this, plant, especially in the tinplate department, has been running full throughout the year, though at low prices. The collapse in American buying of Welsh plates and American competition in Canada, and some other important markets formerly regarded as the preserve of the Welsh makers, were not felt, thanks to the ever-broadening demands from elsewhere.

Looking over the whole position, it is seen that the first real start with the upward movement developed in the late months of the year, when Cleveland pig iron, after drifting to about 46 shillings for cash delivery, gave signs of having bottomed. Fluctuations are to be expected, of course, but there seems little doubt in the trade that the clouds which have overcast the European industrial situation for so long are dispersing and that good times are ahead.

American Semi-Finished Steel a Factor

In one way it was unfortunate for Europe that things should have been so unsatisfactory across the Atlantic, for the heavy imports of half-finished steel, which for the 11 months total 752,000 tons against 488,000 tons in 1910 and 510,000 tons in 1909, had a flattening effect upon the market generally, the large American sales of such material being regarded far more seriously than equally vigorous selling by Germany. A point which has given considerable encouragement to sentiment lately is the knowledge that the German Union of Steel Works is sold out up to April, while the Belgian Syndicate and the French manufacturers simply do not count, as they are far too fully occupied for the time being with home orders. The spasmodic selling of a few lots of Southern pig iron by American producers for shipment to Mediterranean ports in the latter part of the year rather upset the equanimity of the leading markets for Cleveland pig iron, but the resulting feeling of depression was merely temporary. The threat, however, of the German Pig Iron Syndicate to boycott those consumers who purchase British pig iron is a more serious matter.

The liberal supply of foreign semi-manufactured steel and iron has undoubtedly been an enormous boon to certain sections of the British finished trades, for otherwise prices of finished material would have risen to such an extent that it would have been impossible for English manufacturers of galvanized sheets, for instance, to maintain their position in the export markets; while as the year closed the steel works were largely oversold in semi-finished products and were quite unable to make deliveries in anything like reasonable time.

Shipbuilding the Main Stay in 1911

The chief standby of the makers of finished steel last year was the phenomenal activity of the shipbuilders on the Clyde, Tyne, Wear, Tees and West Coast, whose yards are full to repletion. The work already booked insures full operations for at least a couple of years. Indeed, there has never been a period in the trade's history when orders of such magnitude have been held for new shipbuilding; but prices, although advanced late in the year, have not reflected this generally.

An unfavorable section of the heavy steel trade has all along been that concerned with rails, where buying has been slack all the year, but during the closing months rather better railroad buying showed itself, not only as regards permanent way material but rolling stock, and it is interesting to know that very large orders have been booked for products in the construction of which it is stipulated that finished iron shall be used instead of steel. This stipulation has given great satisfaction in what looked very much like becoming a derelict branch of the British iron trade. Within the last few weeks bar iron prices all over the country have risen 5s to 10s a ton, and they will certainly go higher, for all the railroad and colliery proprietors have been caught badly short of cars.

The Rebate on Plates and Shapes

An important proposal carried through by the makers of steel ship plates, shapes, etc., aims at nothing more than the total exclusion of foreign material from the United Kingdom. The makers have banded themselves together, and, by offering a deferred rebate of 5s per ton, payable only to those consumers who can prove by the production of their books that they have bought no foreign material nor material from any non-associated works, have placed themselves in a position to dictate their own terms, since the accumulated rebates amount to so considerable an item that no consumer can afford to disregard them. The scheme has been worked with the utmost success, though, to the great detriment of trade as regards the shipping industry, and there seems no reason why an equal measure of monopoly and profit accruing therefrom should not result to the British steel works concerned. It only requires an extension of the principle to, say, sheet bars and billets, for the British market to be for all practical purposes a sealed book for the foreign manufacturer.

The Copper Market

Copper has had a year of frequent disappointments, but the general feeling in regard to the position has recently undergone a wonderful improvement, cash warrants in December advancing to £63 15s and three months to £65, with strong buying from consumers and speculators. The basis of the improvement was of course the increasing strength of the world's statistical position and the announcement that the chief American producers have sold very heavy quantities for forward delivery. Statistically (assuming the correctness of the copper producers' returns) the position is sounder than it has been for a very long time, and Europeans are not dismayed by the threatened large increase in American production during 1912, regarding the estimates which have been so assiduously promulgated as very wide of the mark.

The Tin Manipulation

Manipulation of tin at the hands of a powerful European group has been in evidence, values fluctuating between £170 and £233 for cash delivery, with an enormous speculative business. Consumption has been exceedingly active throughout the year and supplies distinctly moderate, the high range of prices doing nothing whatever to stimulate production from the chief mining centers, although a larger quantity has certainly come forward from Bolivia. The output as regards the Federated Malay States, however, appears to show a small deficiency, thus justifying the predictions of those who have held all along that the Federated Malay States are not likely in the future to reach the level of a few years ago, when the shipments were 57,000 tons. While the high prices were no doubt to some extent the result of manipulative control, the fact must be

faced that the intrinsic position remains sound, thanks to the remarkable activity of consumption, more particularly in the tin plate trade. At the end of November the visible supply was 16,652 tons against 18,895 tons on November 30, 1910, and 20,013 tons on the same date, 1909, and a very much smaller figure would have been shown had the Banka sale taken place on the last day of the month.

The introduction of a new contract, under which all sorts of what are generally termed "off-grade" tin are deliverable against the ordinary contract, has introduced a remarkable complication as regards the London tin market, and it is impossible to decide at the present moment what will be the ultimate result of the opposition aroused by the innovation. The leading firm in the trade has announced its relentless hostility to the proposals, and has refused on many occasions to have anything to do with the new contract. In view of the fact that these people are credited with controlling almost the entire stock of tin, it will be seen that the future of the market is bound up with unusual uncertainty, and there is talk of transferring the London stock to other centers, where speculative dealings can be carried on without let or hindrance on the old terms. Beyond this, however, the fact must ge kept in mind that consumption is in excess of output, and, after all, this will be the determining factor.

Lead and Spelter

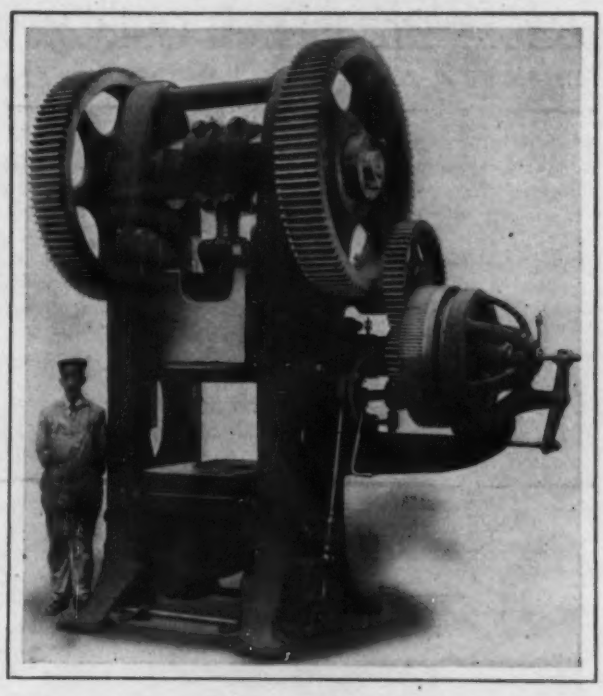
Lead has been under the practical control of the convention whose operations are of a worldwide character, and, while supplies have never been excessive, there was throughout the year a very steady demand from all classes of consumers. Late in December prices slackened a little, as the demand has fallen off temporarily, and this weakness is probably due also to a large extent to tactical movements at the instance of the controlling parties, not unconnected with the fixing of ore contracts. Supplies continue restricted, troubles of one kind or another in Australia and also in Spain having conspired to cause a diminution in the output and shipments. The general opinion of those closely in touch with the situation is that prices are likely to advance in the coming year.

As with lead, spelter has also been under syndicate control, the market having been generally firm throughout the year, with an exceedingly large consumption, thanks to no small extent to the extraordinary activity of the galvanized sheet trade, in which the increased capacity of works has made itself felt, both upon the selling prices of sheets and upon the market rates for the component materials.

An Improved Ferracute Press

A press designed for exerting pressures up to 200 tons and equipped with a new type of friction clutch has been recently built by the Ferracute Machine Company, Bridgeton, N. J. As will be noticed from the accompanying engraving, the clutch mechanism is mounted on a bracket affixed to the side of the press instead of being supported by an outboard bearing resting upon the floor. Some of the special advantages claimed for this arrangement are a construction which makes the clutch a unit with its bracket so that it can be attached to various machines by simply bolting it to a tablet on the side of the machine and the ability to change the position of the press at any time without resetting and realigning the clutch. The improvements which have been made in the clutch itself are having the brake spider a part of the clutch bracket and the addition of a motion which relieves the clutch and does the braking directly without introducing additional mechanism.

The brake spider is a separate piece, but the face or seat to which it is bolted is cylindrical. The axis of the cylinder is the same as that of the clutch shaft, an arrangement which secures perfect alignment. The braking effect is produced by the clutch disk, which is a horizontally moving double cone located between the brake spider and the flywheel. Wooden sectors or blocks, the outer faces of which bear against corresponding surfaces on the inside rim of the flywheel and the clutch spider, are fastened to the front and the back rim of the clutch disk. The blocks are fastened to the disk by carriage bolts and can be adjusted radially by screws provided with lock nuts.



A New Type of Press Having An Improved Friction Clutch Built by the Ferracute Machine Company, Bridgeton, N. J.

Moving the clutch disk in one direction or the other produces the clutching or the braking action as may be desired, this part carrying both the clutch and the brake frictional surfaces. The treadle of the clutch will work in any position so that it is not necessary for it to be set in a vertical one and the clutch can be attached to the machine at different hights by merely lengthening or shortening the treadle rod.

The shaft of the clutch is journaled in two boxes and gear teeth are cut in the enlarged portion of this shaft, thus producing a pinion which engages with the intermediate gear. The flywheel revolves freely on the clutch shaft, the outer end of which is axially bored and a cylindrical rod or piston moves in a horizontal direction in this hole. The inner end of the rod is connected by toggles to the clutch disk, which is given the small amount of motion and the heavy pressure required. The clutch can be operated by placing the foot on the treadle or by the hand lever or if desired the action can be automatic.

The following table gives the principal dimensions and specifications of the press:

Stroke of ram, in.	10
Adjustment of ram, in.	6
Maximum distance between bed and ram, in.	30
Distance between columns, in.	32
Thickness of bolster, in.	5
Ratio of gearing	30 to 1
Over all hight, in.	127
Total weight of press, lb.	38,000

As far as possible the parts requiring adjustment have been made accessible and convenience in making adjustments is a marked feature.

The Globe Iron Company, Jackson, Ohio, has awarded contracts for a number of improvements with the view of making its blast furnace plant up to date in every particular. These will include an ore-handling bridge, a new system of bins, furnace hoist, transfer cars and an electric traveling crane. All of the new equipment will be built and installed by the Variety Iron & Steel Works Company, Cleveland, with the exception of the crane, which will be furnished by the Case Machine Company. The engineering work is in charge of the J. W. Frazier Company, Rockefeller Building, Cleveland, Ohio.

The Thomas Furnace Company, Milwaukee, Wis., has placed a contract with the Variety Iron & Steel Works Company, Cleveland, Ohio, for a 250-ft. bridge, equipped with a 5-ton grab bucket, for handling ore. The J. W. Frazier Company, Cleveland, is the engineer.

Rapid Production Cold Saw

Duplication of Parts Is the Special Field of This New Espen-Lucas Tool

For producing duplicate parts in sizes up to 12 in. in diameter rapidly and accurately, the Espen-Lucas Machine Works, Philadelphia, Pa., has brought out a new cold saw cuting-off machine, which is designated by the builder as a heavy type 12-in. rapid production machine. One of the special features of the tool, which, when equipped with a 40-in. saw, will cut round, square or piled bars having a maximum dimension of 12 in. and 12-in. square sections when equipped with a 42-in. saw blade, is its durability. Fig. 1 is a view of the machine, while Fig. 2 illustrates some of the cuts taken by it.

In its general construction the machine embodies the standard features of the company's line of heavy bar cutting-off machines. It occupies a floor space of 16 x 9 ft. and weighs 30,000 lb. exclusive of the driving motor. Either belt or motor drive can be used, the latter being the type employed in the machine illustrated. The motor in this case is a 25-hp. Westinghouse adjustable speed motor having a speed variation of 2 to 1, the armature of the motor being connected by a belt to a 30-in. pulley having a 6-in. face. A regular starting rheostat is employed, although if desired one of the drum type can be substituted. The drive is through a main shaft and phosphor bronze worm running in oil and a worm wheel located at the rear of the machine. The pinions and the shaft together with the main spindle are solid steel forgings, the gears all being cut from the solid.

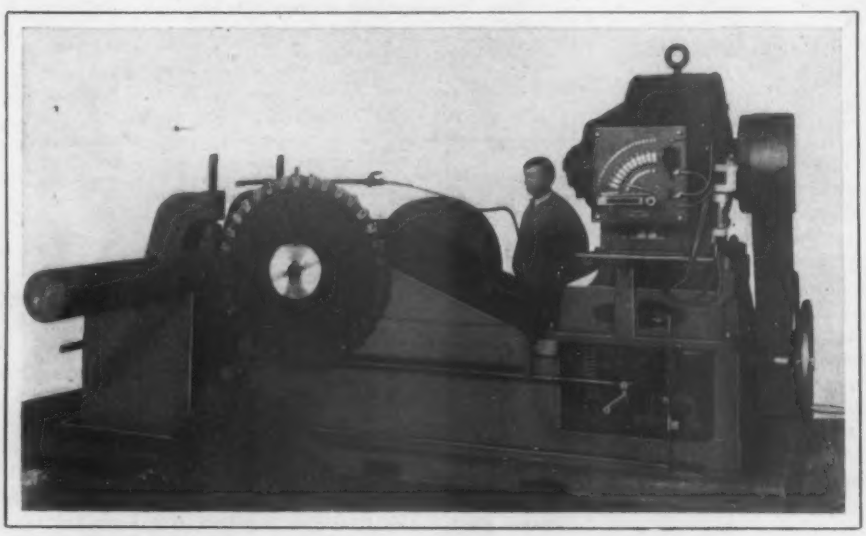


Fig. 1—The New Rapid Production Cold Saw Cutting-Off Machine Built by the Espen-Lucas Machine Works, Philadelphia, Pa.

The spindle, which is 7 in. in diameter, extends the entire width of the carriage, and the saw blade is bolted on a head directly against the driving gear, an arrangement which it is pointed out insures rigidity and avoids the torsional strain between the gear and the saw and at the same time permits the spindle to have a solid bearing for its full diameter for the entire width of the saw carriage, which is 37 in. The saw carriage has a traverse of 14 in. through internal gears controlled by hand wheels or levers from either end of the machine. The feed, which is obtained through a friction plate drive controlled by a hand lever that is automatically locked, varies from ½ to 6 in. per minute. All of these changes are available while the machine is in operation. The carriage also has a quick return obtained through a fricion clutch controlled by a hand lever and an automatic stop for regulating the carriage travel is also provided. In this type of machine the usual taper gibs on the carriage have been done away with and in their place solid steel shoes, which are held to the carriage by screws, have been provided. The reason for making this change was that the gibs when worn were apt to produce chatter, while the shoes when they are worn can be easily removed, trued and again placed in position. The saw blades are of either the inserted tooth type or solid high-speed steel, according to the class of work which is being done.

The work table, which is of the usual type, has T slots for clamping the work in position. The clamps are of the regular screw type with special wheel heads fitted loosely on the wrench ends. These wheel heads, which are of steel, fit over the heads of the screws and by rotating them rapidly a bearing on the work is obtained which is said to be firmer than can be given by the ordinary wrench or lever. By inserting a bar between the projections on the top of the wheels the grip of the clamp is readily released. These heads weigh about 75 lb. and vary in diameter from 15 to 18 in. If desired special pneumatic clamps can also be furnished with the machine.

For producing duplicate work such as gear blanks, etc., an automatic device for bringing the saw blade up to the work and returning the blade to its original position ready to enter the work without stopping the operation of the machine is provided. A special carriage is also supplied for the conveniently handling and accurately cutting to length of heavy bars up to 30 ft. long. This carriage is attached directly to the work table of the machine with a suitable support at the extended end. The carriage is mounted on two shafts, one of which serves through a rack and pinion operated by a hand wheel as a means of moving the carriage with the work clamped up to the saw and the other carrying a collar which can be clamped at a point representing the length of the cut desired by a set screw, serves as a stop for the carriage and thus governs the length of the piece to be sawed.

One of the special features of this machine is the elimination of the customary drip pan, which is generally located below the saw in the front of the machine. The objections pointed out for this position for the drip pan by the builder are that the pan fills with chips and interferes with the flow of water together with the danger of breakage due to the falling of heavy pieces of work which have been cut off. In its stead a reservoir with a concrete foundation under the machine has been provided and

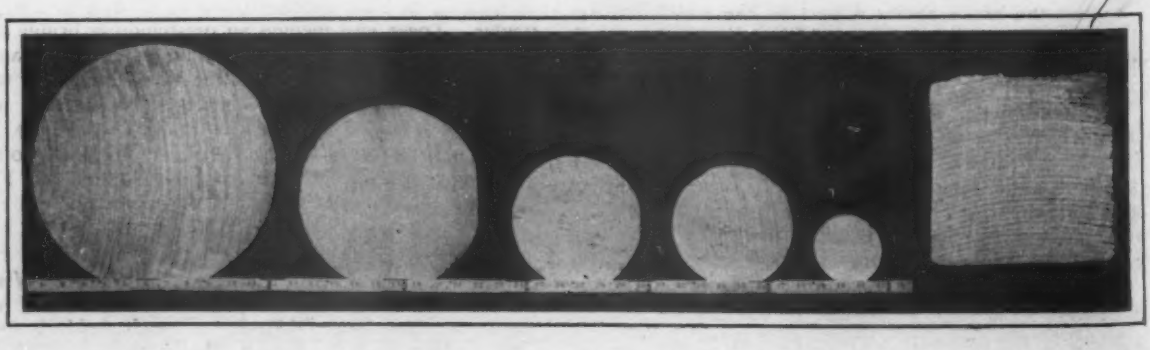


Fig. 2—Specimens of Cuts Taken by the New Machine

there is a runway through the base which leads to the reservoir. The foundation proper forms the drip pan and from this reservoir the water is pumped to the saw blade by a small belt-driven pump located at the rear of the machine, the power being taken from the main shaft. The location of the reservoir in the foundation is such that it is easily accessible from the rear of the machine so that it can be readily cleaned out if necessary.

Shop tests made on this machine showed that a 10-in. square steel bar having a carbon content of 0.35 per cent. was cut in 4 min. 52 sec., while bars 2 in. larger were cut in 6 min. The time made for cutting other sizes of bars were 9 in., 3 min.; 6 in., 1 min. 27 sec.; 5½ in., 28½ sec., and 3½ in., 27 sec. A steel bar 9 in. in diameter having 0.45 per cent. carbon and 3.5 per cent. nickel was cut off by this machine in 3 min. 20 sec.

The New Iron and Steel Tariff Bill

WASHINGTON, D. C., January 8, 1912.—The tariff bill embodying the proposed changes in the iron and steel schedule is still in the hands of the sub-committee of which Mr. Palmer, of Pennsylvania, is chairman. It will embrace also certain items in the chemical and agricultural schedules that the sub-committee believes properly belong to the iron and steel schedule. This change will be made not only to make the bill more scientifically exact, as expressed by a member, but to prevent the disarrangement of the schedules in question that would necessarily follow if it were not done.

A draft of the sub-committee bill has been sent to the Public Printer. It is the present expectation that the sub-committee will some day this week lay its report before the Democratic members of the full committee, by whom it will be considered, and such changes as may be deemed advisable will be made before it is introduced in the House. It will then be reported back to the Ways and Means Committee, when the minority members will have their first opportunity to study its provisions. The time for this purpose will be short, for in all probability the bill will be reported to the House within the following 24 hours.

If the House has before it no measure of special importance the tariff bill will be taken up almost immediately and passed after a few days for debate. It is expected that the bill will so nearly meet the approval of the House Democrats that no opposition from that quarter need be expected, and the indications are that it will be sent to the Senate not later than February 1.

The sub-committee has been successful thus far in preserving its secrets, for none of the newspaper correspondents have been able to secure the slightest information regarding the changes except in general terms. Members of the committee decline even to discuss the character of the proposed changes. One of them when asked whether the changes would be material replied with a smile that some persons might regard them as inconsequential while others might regard them as excessive.

It is generally understood that iron ore will be placed on the free list, but this doubtless is only a guess. When the existing law passed the House three years ago iron ore was placed on the free list, but the Senate restored it to the dutiable column again, fixing the rate at 15 cents a ton. It is not regarded as likely that a Democratic House would do less with the Underwood bill than a Republican House did with the Payne bill, especially with the remembrance of Mr. Bryan's criticisms of a duty on raw wool still fresh in the Democratic mind.

Another sub-committee is now at work preparing changes in the chemical schedule, and this bill also will be ready for submission to the Democratic members of the full committee within a few days. J. G.

It is reported that the Atlanta Steel Company, Atlanta, Ga., plans the erection of an additional open-hearth furnace and the installation of a number of important improvements. Details will be determined in the near future.

The Whitney Silent Chain

After a number of years of experimental work the Whitney Mfg. Company, Hartford, Conn., has added a unique design of silent type chain to its list of specialties. One of the special features of this chain is the subjecting of the entire width to wear, an arrangement which is made possible by the use of guide plates. Fig. 1 is a longitudinal

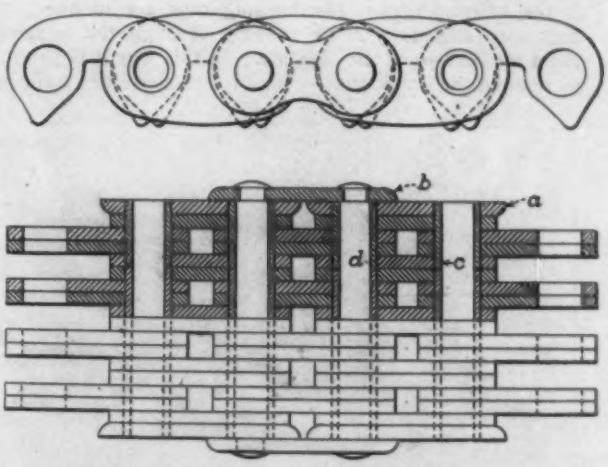


Fig. 1—Section Through a New Silent Type of Chain Recently Brought Out by the Whitney Mfg. Company, Hartford, Conn.

horizontal section of the chain, while Fig. 2 is a view showing the various parts separately and put together.

Referring to Fig. 1, the guide plates *a* are connected by outside plates, *b*, which increase the tensile strength. When the links are assembled each joint has four wearing surfaces, which give a chain possessing long life. These guide plates are shown in the lower portion of Fig. 2, directly back of the connecting link, which consists of two parts, A and B. The hardened steel bushings *c*, Fig. 1, are forced into the guide plates by machinery and are held fast to keep them from turning. The steel links turn about the outside of the hardened steel bushings and the hardened steel rivets *d*, which are also forced into the outside plate, turn within the bushings. As a result of employing a type of construction which distributes the wear over the entire width of the chain, it is not necessary to employ flanged or grooved sprocket wheels.

In connecting the chain preparatory to use, the pilot pin C, Fig. 2, is placed upon one of the rivets in the portion of the connecting link A, the whole being shown at D. The other portion of the link B is not placed in position until the rivets in the other part have come through the chain. It is then slipped over the end and a couple of cotter pins are driven through the holes in the rivet end and spread. It will be noticed that the shape of the pilot pin enables it to pass through the holes in the intermediate links easily.

These chains are made in five sizes, the pitch ranging from ⅜ to 1 in. Various widths of chains can be supplied

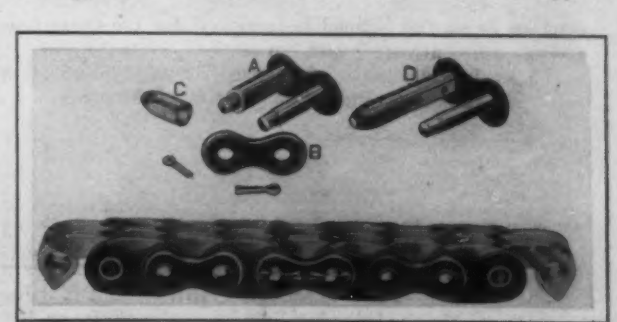


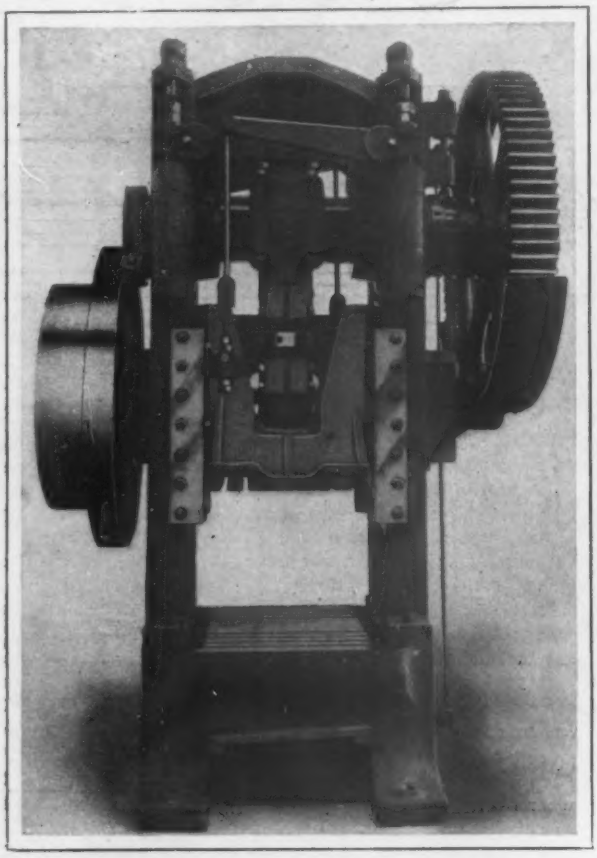
Fig. 2—View Giving Details of the Chain

to suit the requirements of its different applications, which include driving of magnetos and cam shafts on gasoline engines, machine tools, line shafting, motors, generators and pumps, and also in automobile transmission for changing the speed. The width of the chain can be varied easily in each case by adding or removing the requisite number of intermediate links.

A Heavy Single-Crank Press

The A. Garrison Foundry Company, Pittsburgh, Pa., has recently built a new type of heavy, single-crank press. Although designed especially for trimming nickel-steel forgings for six-throw automobile crank shafts, it can be adapted with but slight changes to all kinds of work in both hot and cold metal.

The press, which follows the company's usual practice, is the built-up type. The housing caps are in one piece and are secured by bolts running through the housings from the bottom of the machine. In this way it is possible to remove the crank shaft without disturbing any adjacent



A New Design of Heavy Single-Crank Press Built by the A. Garrison Foundry Company, Pittsburgh, Pa.

posts, piping or machinery. Like the 400-ton double-acting press, which was illustrated in *The Iron Age*, January 12, 1911, the head is counterbalanced by spring levers in the same general way. The advantage of using springs instead of counterweights is that the weight of the moving parts, and consequently their inertia, is greatly reduced. This decrease in weight also results in a corresponding reduction of the pound on the clutch when the machine is started. Steel is employed for the cross head, and the gears are steel with cut teeth.

The following table of dimensions and specifications will be of interest as indicating the size of the press:

Distance between housings, in.	37
Stroke, in.	6
Width of bed, in.	48
Width of cross head face, in.	31
Depth of cross head face, in.	40
Maximum distance between bed and cross head face, in.	30
Diameter of main bearings, in.	8
Weight, lb.	40,000

The clutch is of the automatic crab type and is driven by a square shank, forged solidly upon the shaft, no keys being employed.

The firm of LeSourd & Walpole, sales agents, with offices in the Brown-Marx Building, Birmingham, Ala., has been dissolved. N. C. Walpole will continue as sales agent to represent the Niles-Bement-Pond Company, the Pratt & Whitney Company and the Cleveland Pneumatic Tool Company in the Southern States, and will have offices at the old address.

The Newark Foundrymen's Association

The Newark Foundrymen's Association, Newark, N. J., at its meeting on the evening of January 3, was addressed on the subject of "Liquid Fuel" by W. N. Best, of New York City, the designer of oil and tar-burning apparatus which is in wide use. Mr. Best described the types of crude oil, the gravities, caloric value, and air consumption in combustion, and gave comparisons with bituminous coal. He also described and illustrated with lantern slides various types of burners and the construction of the principal kinds of furnaces used in manufacturing of various sorts. He declared emphatically that oil has many times been unfairly blamed for failures when it was improperly designed apparatus that really was at fault. He reiterated an assertion he often has made that there is too much "burning at oil, instead of the burning of oil." Mr. Best has studied the subject for 22 years.

The speaker's remarks on the subject of oil burning in air furnaces (malleable iron melting furnaces) aroused the particular interest of the foundrymen. He explained that in his system for air furnaces there is provided a combustion chamber of such form and proportions that the air necessary for complete combustion can unite with the atomized fuel before it reaches the furnace proper, thereby preventing the oxidization of the charge. The chamber also causes the heat to be deflected upon the entire surface of the bath. In the end of the chamber is placed a hydrocarbon burner, which externally atomizes the fuel and makes a fan-shaped blaze, filling the entire chamber with flame. A small quantity of compressed air is used through the burner to atomize the fuel and distribute the heat, while the balance of the air necessary for combustion is supplied at from 3 to 6 oz. pressure through a volume air nozzle. The furnace is charged in the ordinary manner.

The speaker directed the attention of his audience to the fact that the first air furnace to which he had ever applied his principles was that of the Barlow Foundry Company, Newark, which, it is said, stands on the site where the first malleable iron was made in the United States by Seth Boyden.

Mr. Best stated that his system proved the advantages of oil over coal in several ways, which he enumerated as follows: With oil properly used sulphur is eliminated to the limit, there being, in fact, less sulphur in the metal when poured into castings than there was when charged into the furnace. The metal is non-oxidized. The metal can be heated easily to any temperature desired, regardless of atmospheric conditions. One melter can operate several furnaces and there is no handling of coal or ashes, with a consequent saving in labor cost. The life of the refractory material is increased 25 per cent. The quality of the metal produced is of a superior grade, first, because of the reduction of sulphur and, second, because oil is a refiner and increases the tensile strength of the casting. The furnace can be operated with certainty as to results; started at a certain hour and tapped at a certain time without a variation of 10 minutes.

Mr. Best described his system as applied to mold and core-drying ovens, wherein the stack is eliminated and an even distribution of heat maintained by one burner placed at one end of each oven, an arrangement which he declared would obviate overheating or uneven heating of the molds or cores. He also touched upon the many other uses of oil fuel in such work as annealing, case-hardening, crucible steel melting, drop forge work, flue welding, operating glass lehrs, rolling mill work and in boilers and locomotives. Recently he equipped the works of the Hershey Chocolate Company, at Hershey, Pa., with oil burners to replace coke for the baking of chocolate beans, an installation which was difficult because of the low temperature required with absolute evenness of distribution. He mentioned the chocolate company to show the range of oil as a fuel. He also referred to the fact that his tar burners are used in many lighting plants, municipal and private.

The Thomas Iron Company, which blew out its Keystone furnace at the end of November, has now blown out the one of its Hellertown stacks which has been active in the past year. It is proposed to put one Lock Ridge furnace at Alburtis, Pa., on the idle list, which would leave in blast only one furnace—the largest of the group at Hokendauqua, Pa.

Wall Drilling and Reaming Machine

A New Machine Tool of the Gang Company Supplied for the Isthmian Canal

A number of wall-type reaming and drilling machines have been recently furnished to the McClintic-Marshall Construction Company, contractor for the steel work on the Panama Canal locks, by the William E. Gang Company, 1543 Queen City avenue, Cincinnati, Ohio. These machines are to be used principally for drilling and reaming, and when in operation they are attached in gangs to the columns or legs of a movable steel structure, the design of which is similar to that of a gantry crane. A view of the machine itself is given in Fig. 1, while details of two parts of the mechanism, namely, the device for elevating the machine and the ballthrust bearing, are shown in Figs. 2 and 3, respectively.

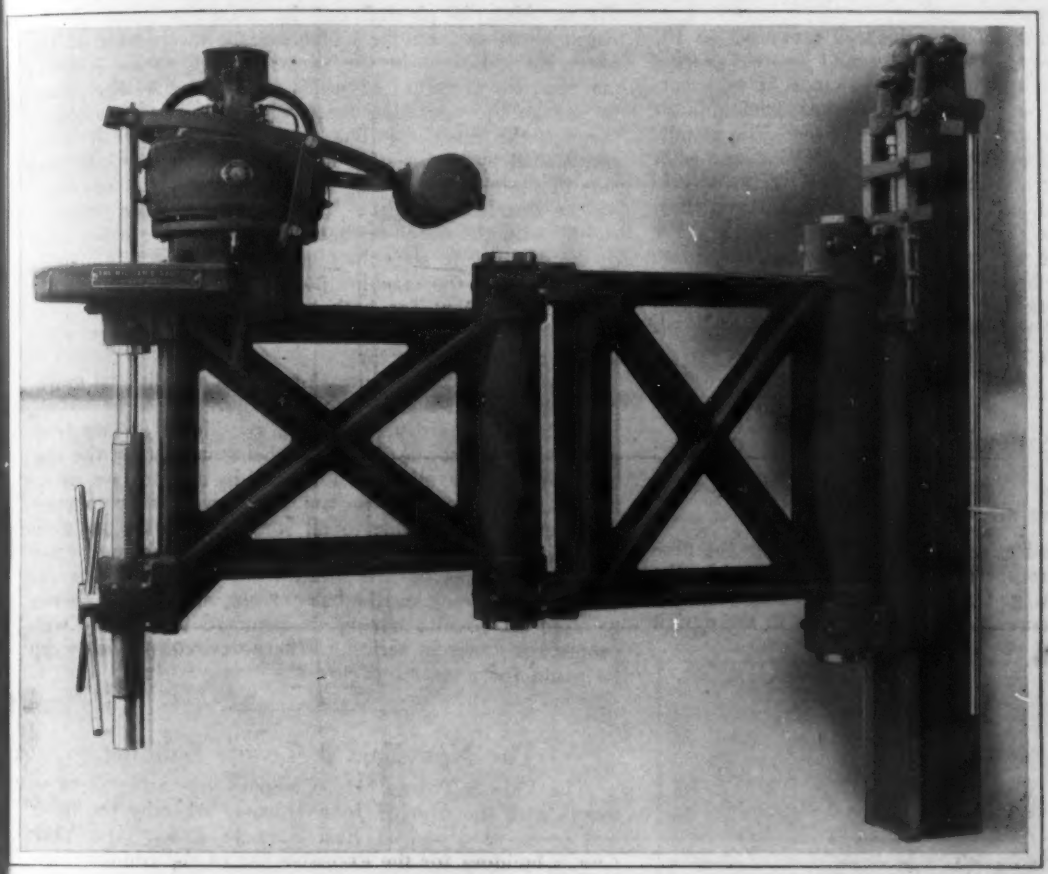


Fig. 1—A Wall Reaming and Drilling Machine Built by the William E. Gang Company, Cincinnati, Ohio

As will be noticed from Fig. 1, the drill spindle and its driving motor are mounted on a double-hinged arm, consisting of two 4-ft. sections. The maximum distance from the center of the spindle to the face of the wall plate is 103 in., and the vertical travel of the arm on the wall plate is 53 in. Fig. 2 shows the elevating mechanism in detail. A 2½-in. elevating screw, *a*, is hung on a roller-thrust bearing, *b*, in a bracket that can be set on either side of the wall plate. The elevating screw connects by mitre gears and a sliding clutch, *c*, with the power shaft *d*. In this installation a single motor was employed to drive the elevating mechanism for a group of machines. Bronze bushings are provided for all the bearings. The lever shown in Fig. 1, hanging from the elevating gear bracket, controls the vertical movement of the arm, while the slotted bar is the adjustable stop for limiting the hight of travel. The elevating lever is locked in the neutral position.

A pull of less than 10 lb. is said to be sufficient to move the arm to any position, as it is provided at the hinges or

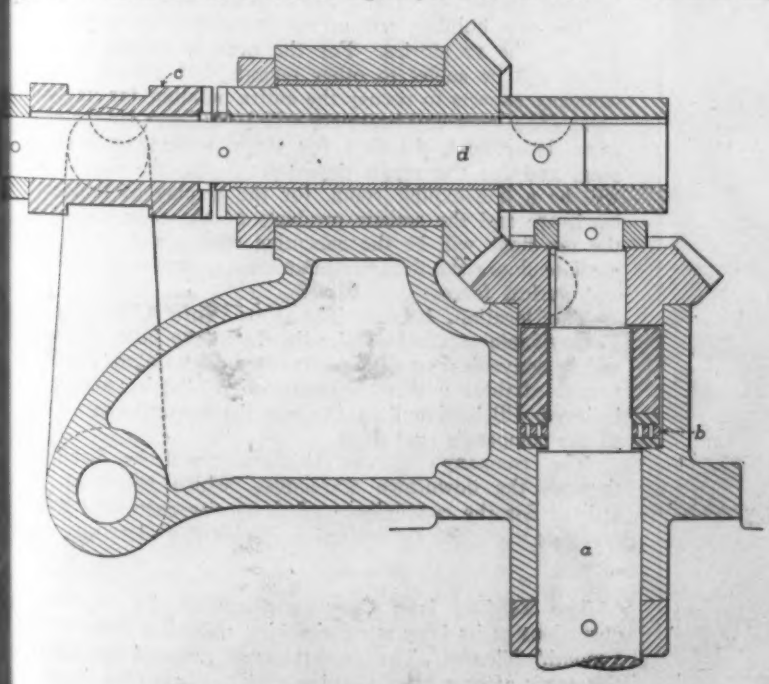


Fig. 2—Elevating Mechanism

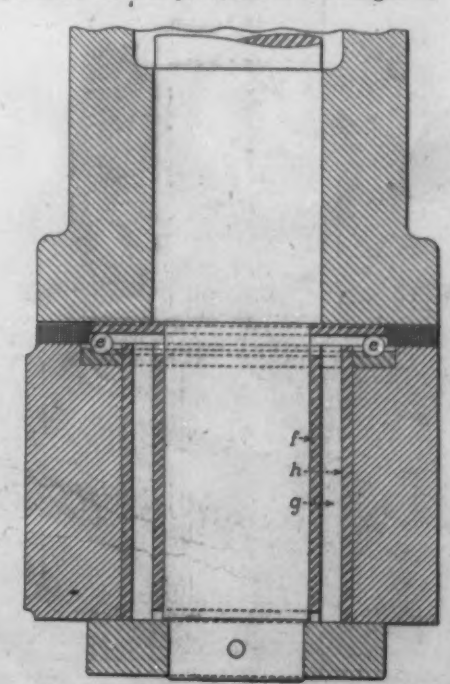


Fig. 3—Ball Thrust Bearing

Details of Two Parts of the Mechanism

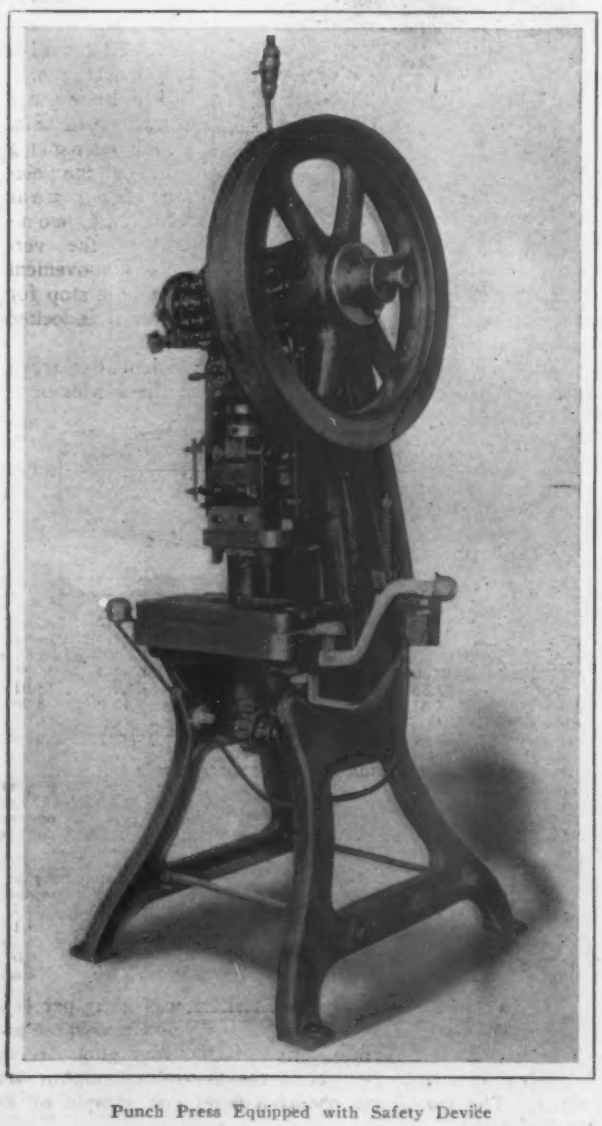
trunnions with roller and ball-thrust bearings, the latter being shown at *ee*, Fig. 3. From this engraving it will be noticed that between the inner steel sleeve *f* and the outer one *h* rollers *g* are located. If looseness should develop on account of wear the sleeves can easily be taken out and renewed without affecting the steel trunnions. The trunnion journals are capped to facilitate their being taken apart, and they are tongued, grooved and tapered dowel pinned to insure accurate alignment. In designing the bearings care has been taken to provide means to exclude dirt and dust from them.

The spindle-driving motor, which is mounted on the forward gate or arm, is directly connected by steel gearing to the spindle. The spindle, which is made of high carbon crucible steel, runs in a bronze-bushed steel quill or sleeve, and has a vertical traverse of 26 in. The spindle is raised or lowered by a steel rack and pinion and pilot wheel, the levers for the latter being securely screwed into the steel pinion head and pinned in position to keep them from working loose. A steel gear guard protects the spindle gear, and the way in which the spindle is counterbalanced is clearly brought out in Fig. 1. The motor employed for driving the spindle is a 3¼-hp. Crocker-Wheeler motor, and the total weight of the machine, including the motor, is 7000 lb.

Punch Press with Safety Device

Elimination of Foot Treadle Release Without Cutting Down the Machine Output

An interesting and effective safety device for the protection of punch press operators, has been perfected by the Benjamin Electric Mfg. Company, Chicago. In the pursuit of increased operating speed, a tendency in the design of presses, as well as other machines, has been to so dispose the operating mechanism as to leave both hands of the operator free to handle the work. Ordinarily on a punch press this is possible by reason of the foot-treadle release. The Benjamin safety device tends in exactly the opposite direction, by eliminating the foot treadle and requiring that both hands of the operator be used to operate the tool.



Punch Press Equipped with Safety Device

The device is shown in the accompanying illustration. A hand-operating lever, shown on the right hand side of the machine, is pivoted on the press to swing freely. Rigidly mounted on the clutch release mechanism of the press, as indicated in the illustration, are two solenoid magnets, the armature of which is a locking ratchet, hung to engage the operating lever when the circuit is closed through the magnet. The closing of this circuit is accomplished by means of a button located at the left-hand side of the machine. The circuit-closer requires one hand of the operator, and the operating lever, when engaged rigidly with the clutch-release rod, requires the other hand of the operator to start the machine. Only in this manner is a stroke of the machine possible. With this device a definite movement for both hands of the operator away from the point of danger is provided at the time when accident is likely to occur.

As opposed to the impression that the additional movement required of the operator would cut down the output, it has been demonstrated that the confidence arising from a knowledge that the danger of being caught by the machine is entirely eliminated results in an increase of as much as 30 per cent. in the amount of work accomplished. The device is adaptable to all standard presses and does not require the drilling of any holes or the making of any essential changes for its attachment. The magnets are wound for 110-volt continuous current, and can, of course, be used on circuits having this voltage in multiple with proper resistance in series. Where desired, provision can be made for alternating current.

The New Yale & Towne Building

The Yale & Towne Mfg. Company has made arrangements with the firm of John Downey whereby the latter will erect, at 9 and 11 East Fortieth street, New York City, a building for the exclusive use of the company, under conditions which secure to it a long tenancy. For many years the executive offices of the company and its city store have been located at 9 Murray street. The decision to move to an uptown location on the expiration of its present lease, May 1, 1913, is indicative of the general trend of business of many kinds which has produced such marked changes during the last few years in the district between Twenty-third and Forty-second streets.

The new building will occupy a lot about 50 x 100 ft., and will be 12 stories. For the present several of the floors will be sublet to other tenants, but ultimately the company expects to occupy the entire building for its own uses. The store and basement will be utilized for the city sales department, the first for stock, packing and shipping, and for the repair department. On the first floor will be a fine exhibit room, for the display of builders' hardware and the artistic products of the company. On the top floor will be the executive offices, and on intermediate floors the department managers, treasurer's office and clerical force.

The location, between the New York Central and Pennsylvania terminals and adjacent to the hotel district, will be convenient to all out of town customers and central for all of those within the metropolitan district, and it is believed will be found to promote the convenience of all of the company's customers.

The company's export shipments will be handled through the downtown warehouse, which will also be utilized for the convenience of those city customers who prefer to use it for the collection of pick-up orders.

The Reading Iron Company, Reading, Pa., resumed operations at its Oley street finishing mills last week after a month's idleness. The No. 6 tube mill resumed operations this week after a brief shutdown. The sheet mill department is working full capacity.

Iron and Steel Making in Texas---II

Analyses from 14 Counties Show the Existence of Deposits of Excellent Brown Iron Ore, but with Little Data as to Amount

BY WM. B. PHILLIPS.*

In order to make satisfactory replies to the numerous inquiries with respect to the quality of the east Texas iron ores, we have undertaken to examine and classify 207 analyses. Many of them were taken from the report of William Kennedy on "The Iron Ore Districts of East Texas" (Texas Geological Survey, Second Annual Report, 1890), which is our chief source of information with respect to these ores up to the time of its publication. This report has long been out of print and copies of it are scarce. In addition, we have had access to many more recent analyses, especially of ores from Cass and Marion counties, where extensive development work during the last two years, particularly that of the Texas Iron & Coal Company, has contributed so much to our knowledge of these ores and of the greatly enlarged area within which excellent material is to be found.

Four Groups of Ores

In studying these analyses it was decided to divide them into four groups: *e. g.*, from 40 to 45, 45 to 50, 50 to 55 and 55 to 60 per cent. of iron. All ores containing less than 40 per cent. of iron are disregarded. The time may come from such low-grade material may be used, through processes of crushing, jigging, etc., but we need not concern ourselves with this now. We distinguish, then, four classes of these ores:

Medium, containing from 40 to 45 per cent. of iron.
Good, containing from 45 to 50 per cent. of iron.
Very good, containing from 50 to 55 per cent. of iron.
Extra, containing from 55 to 60 per cent. of iron.

It is probably the case that most of the so-called brown ores (and, with the exception of some carbonate ore, all of the east Texas iron ores are of this character) used in this country carry about 45 per cent. of iron. It is an exception to the general rule when such ores carry as much as 50 per cent. of iron, save when they are calcined, and this practice is not common. Such ores go direct from the washers to the stockhouse, a very small proportion being calcined or otherwise improved. How is it with the Texas ores in respect of the classification adopted?

A Comparison of Ores from the Different Counties

In answering this question it is best to take each county by itself and group the ores according to their composition. There are 14 counties involved, as follows:

	Analyses.	Area of the County, Sq. Mi.
Anderson	9	1,060
Cass	47	945
Cherokee	10	990
Gregg	2	287
Henderson	10	940
Marion	65	384
Morris	10	278
Nacogdoches	4	962
Panola	6	814
Rusk	10	915
Shelby	4	814
Smith	22	984
Upshur	5	587
Wood	3	688
	207	10,648

We will now take these counties up, seriatim.

ANDERSON COUNTY, 9 ANALYSES

Medium ..... 44.50 per cent.
Good ..... 55.50 per cent.

It is not necessary to give the lime or magnesia in these ores or in any east Texas iron ores, for they exist in negligible amounts, rarely rising to as much as 0.50 per cent. on the average. Of the Anderson County ores there were 44.5 per cent. that carried from 40 to 45 per cent. of iron and 55.5 per cent. that carried from 45 to 50 per cent. of iron. These ores are, therefore, medium and good. Their average composition is as follows:

	Medium.	Good.	Av. all analyses.
Metallic iron	42.37	47.35	45.15
Silica	17.21	11.08	13.80
Alumina	14.36	8.10	9.29
Phosphorus	0.109	0.178	0.148
Sulphur	Trace	Trace	Trace

In the good ores (=55.5 per cent. of the total number) the maximum silica was 13.36 per cent. and the maximum phosphorus was 0.545 per cent.

CASS COUNTY, 47 ANALYSES

Medium ..... 29.8 per cent.
Good ..... 23.4 per cent.
Very good ..... 23.4 per cent.
Extra ..... 23.4 per cent.

Average Composition:

	Medium.	Good.	Very good.	Extra.	Average all analyses.
Met. Iron	42.43	48.23	52.33	57.58	48.64
Silica	18.26	11.85	5.19	3.94	10.64
Alumina	11.33	7.85	5.21	5.21	7.65
Phosphorus	0.108	0.147	0.107	0.052	0.103
Sulphur	0.098	0.133	0.124	0.065	0.104

One sample, not included in this classification, contained iron 60.44, silica 3.50, phosphorus 0.038, sulphur 0.220.

CHEROKEE COUNTY, 10 ANALYSES

Medium ..... 40 per cent.
Good ..... 60 per cent.

Average Composition:

	Medium.	Good.	Av. all analyses.
Met. Iron	42.34	46.18	44.64
Silica	22.62	17.19	19.01
Alumina	11.47	10.35	10.94
Phosphorus	0.156	0.140	0.146
Sulphur	0.227	0.029	0.117

In the medium ores the maximum silica was 25.13, the maximum alumina 23.41, the maximum phosphorus 0.315 and the maximum sulphur 0.607. In the good ores alumina was determined in only one sample. The maximum silica was 20.36 and the maximum phosphorus 0.284.

GREGG COUNTY, 2 ANALYSES

Good ..... 50 per cent.
Very good ..... 50 per cent.

Average composition:

	Good.	Very good.	Av. all analyses.
Met. iron	46.88	52.79	49.83
Silica	11.60	10.10	10.85
Alumina	....	6.78	6.78
Phosphorus	....	0.192	0.192
Sulphur	....	0.044	0.044

In the good ores the alumina, phosphorus and sulphur were not determined.

HENDERSON COUNTY, 10 ANALYSES

Medium ..... 40 per cent.
Good ..... 40 per cent.
Very good ..... 10 per cent.
Extra ..... 10 per cent.

Average composition:

	Medium.	Good.	Very good.	Extra.	Average all analyses.
Met. Iron	42.30	46.99	51.52	56.31	46.39
Silica	17.53	12.60	10.06	4.30	13.01
Alumina	6.31	9.53	9.89	3.15	8.90
Phosphorus	0.173	0.192	Trace	Trace	0.162
Sulphur	Trace	Trace	Trace	Trace	Trace

MARION COUNTY, 65 ANALYSES

Medium ..... 4.6 per cent.
Good ..... 15.4 per cent.
Very good ..... 9.3 per cent.
Extra ..... 70.7 per cent.

Average composition:

	Medium.	Good.	Very good.	Extra.	Average allanalyses.
Met. Iron	43.18	46.69	53.80	57.43	54.91
Silica	19.55	13.10	4.90	3.27	5.18
Alumina	7.41	8.40	8.33	2.69	4.30
Phosphorus	Trace	0.093	0.070	0.084	0.073
Sulphur	0.030	0.380	0.156	0.100	0.067

In two of the good ores the silica was 26.43 per cent. In one the alumina was 19.96 per cent., and maximum sulphur was 0.735. In one sample of the very good ore the alumina was 16.50 per cent.; the maximum sulphur was 0.304. The maximum phosphorus in one sample of the

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extra ore was 0.22 and the maximum sulphur was 0.22. This county has not only the highest average of extra ore, but the highest general average in metallic iron, viz., 54.91 per cent.

MORRIS COUNTY, 10 ANALYSES

Very good ..... 50 per cent.
Extra ..... 50 per cent.

Average composition:

	Very good.	Extra.	Av. all analyses
Met. Iron	52.82	56.85	54.83
Silica	7.76	5.55	6.85
Alumina	4.99	3.39	4.19
Phosphorus	0.132	0.113	0.125
Sulphur	0.007	0.011	0.009

In the very good ores the maximum silica was 13.10, maximum alumina 6.84 and the maximum phosphorus 0.209. Considering that no analyses with less than 51 per cent. of iron are quoted from this county it would appear that the best general average of ore is from Morris County, although Marion County has the highest percentage of ore with more than 55 per cent. of iron.

NACOGDOCHES COUNTY, 4 ANALYSES

Medium ..... 75 per cent.
Good ..... 25 per cent.

Average composition:

	Medium.	Good.	Av. all analyses.
Met. Iron	42.19	46.05	43.15
Silica	20.63	22.70	21.15
Alumina	18.88	....	9.44
Phosphorus	0.554	....	0.554
Sulphur	Trace	....	Trace

PANOLA COUNTY, 6 ANALYSES

Medium ..... 33.3 per cent.
Good ..... 33.3 per cent.
Very Good ..... 33.3 per cent.

Average composition:

	Medium.	Good.	Very Good.	Average all analyses.
Met. Iron	43.76	49.04	50.81	47.87
Silica	22.85	13.85	9.97	15.54
Alumina	11.77	6.58	4.39	5.59
Phosphorus	0.340	0.165	0.087	0.157
Sulphur	....	1.215	0.148	0.706

These ores are relatively high in sulphur, the maximum in the good ores being 2.42 per cent.

RUSK COUNTY, 10 ANALYSES

Medium ..... 10.0 per cent.
Good ..... 40.0 per cent.
Very good ..... 50.0 per cent.

Average composition:

	Medium.	Good.	Very Good.	Average all analyses.
Met. Iron	44.03	48.78	51.84	49.83
Silica	24.90	10.46	9.25	11.30
Alumina	6.31	10.40	6.32	7.75
Phosphorus	....	0.325	0.340	0.300
Sulphur	....	0.053	0.166	0.104

One sample of the good ore gave 5.60 per cent. of oxide of manganese. In this class of ore the maximum alumina was 15.10, maximum phosphorus 0.690. In the very good ore the maximum silica was 14.10, maximum phosphorus 0.615, maximum sulphur 0.688.

SHELBY COUNTY, 4 ANALYSES

Medium ..... 75 per cent.
Good ..... 25 per cent.

Average composition:

	Medium.	Good.	Av. all analyses.
Met. Iron	42.31	49.80	44.18
Silica	23.13	16.50	21.47
Alumina	9.23	9.36	9.26
Phosphorus	0.170	....	0.170
Sulphur	0.166	....	....

The sulphur was determined in only one sample. Of the medium ores one sample contained 0.34 per cent. of phosphorus and another a trace.

SMITH COUNTY, 22 ANALYSES

Medium ..... 54.5 per cent.
Good ..... 31.8 per cent.
Very good ..... 9.1 per cent.
Extra ..... 4.5 per cent.

Average composition:

	Medium.	Good.	Very good.	Extra.	Average all analyses.
Met. Iron	42.12	46.91	52.19	55.87	45.19
Silica	17.88	15.25	4.40	3.00	15.23
Alumina	11.58	6.79	9.83	....	9.96
Phosphorus	0.483	0.216	0.428	....	0.326
Sulphur	0.073	0.029	0.018	....	0.054

In the medium ores the maximum silica was 26.90, maximum alumina 30.63, maximum phosphorus 1.490. In the good ores the maximum silica was 25.40, the maximum alumina 8.83 and the maximum phosphorus 0.497.

UPSHUR COUNTY, 5 ANALYSES

Medium ..... 20.0 per cent.
Good ..... 40.0 per cent.
Very good ..... 20.0 per cent.
Extra ..... 20.0 per cent.

Average composition:

	Medium.	Good.	Very good.	Extra.	Average all analyses.
Met. Iron	43.09	46.14	50.24	56.44	48.39
Silica	22.32	15.31	14.10	4.30	14.27
Alumina	6.03	7.61	2.82	2.22	5.24
Phosphorus	0.069	0.061	Trace	0.116	0.061
Sulphur	0.032	0.117	0.091	0.006	0.073

WOOD COUNTY, 3 ANALYSES

Good ..... 66.6 per cent.
Very good ..... 33.3 per cent.

Average composition:

	Good.	Very good	Av. all analyses.
Met. Iron	46.40	53.76	48.86
Silica	17.95	9.50	12.13
Alumina	3.90	....	3.90
Phosphorus	0.460	Trace	0.307
Sulphur	0.105	0.116	0.109

The Analyses Classified

Putting the foregoing data in a more succinct form we have the following statement in regard to the analyses and grades of ore from the various counties involved:

	Medium.	Good.	Very good.	Extra.	Total.
Anderson	4	5	..	..	9
Cass	14	11	11	11	47
Cherokee	4	6	..	..	10
Gregg	..	1	1	..	2
Henderson	4	4	1	1	10
Marion	3	6	10	46	65
Morris	..	..	5	5	10
Nacogdoches	3	1	..	..	4
Panola	2	2	2	..	6
Rusk	1	4	5	..	10
Shelby	3	1	..	..	4
Smith	12	7	2	1	22
Upshur	1	2	1	1	5
Wood	..	2	1	..	3
Total	51	52	39	65	207
Per cent.	24.2	25.1	18.8	31.9	100

Some of the Best Brown Ores in the Country

Of the ores represented by these analyses about one-fourth are of medium grade, about one-fourth are good, nearly one-fifth are very good and nearly one-third are of extra quality and carry from 55 to 60 per cent. of iron. It has been already stated that the total area involved in these 14 counties is 10,640 sq. mi. This must not be taken to mean that all of this territory is ore-bearing. This is certainly not the case. Just how much of this area will be productive of workable ores of the medium, good, very good and extra grades is not now known. This is really the vital question and not what will be the average composition of the ores. There is a vast difference, insofar as concerns shipments of these ores or even their use locally, between material carrying between 40 and 45 per cent. of iron and material carrying between 50 and 55 per cent. This difference is acutely accentuated when we consider the ores of extra quality carrying from 55 to 60 per cent. of iron. If the statement that nearly one-third of these ores are of extra quality be true (and we believe it to be so, within a reasonable degree of accuracy) we have in them the very best brown ores in the country. When one considers the easy reducibility of these ores and the cheapness with which they can be mined and handled it may not be extravagant to say that they rank with the best ores of any kind, brown, hematite or magnetite. What they lack in metallic iron would be more than counterbalanced by reduced costs in smelting.

It may, however, be urged that the extent of the deposits, of whatsoever grade, has not yet been definitely established. This same remark holds good for many other brown ore deposits, some of which have yielded a very large amount of ore. But while this is true it does not affect the situation in Texas. That brown ore deposits elsewhere, which have not been thoroughly prospected in advance of the shovel, have yielded and are still yielding large tonnages is no proof that these deposits will also yield large tonnages.

In respect of brown ore it is particularly true that "the proof of the pudding is in the eating." Professor Pick-and-Shovel is the only competent instructor in this school.

Results of Exploration Thus Far

The work that has been prosecuted during the last two years and which is still in progress has shown, among other important things, that the extent of the very good and extra ores is much larger than anyone had reason to anticipate. Ground which did not appear to be ore-bearing at all, in a commercial sense, has been found to

carry very considerable deposits of ore with more than 50 per cent. of iron and under such conditions that it can be mined and loaded for less than $1 a ton. The greater part of these ores are not held in tenacious clay. This is a point much in their favor, as it will diminish in a marked degree the cost of preparing them for shipment. The record of about 2,600 tons, not mined with any special care, neither washed nor screened, shows a content of metallic iron above 57 per cent., with phosphorus ranging from 0.10 to 0.20 per cent.

The clays with which these ores are so closely associated are sandy, friable, of loose texture and easily removed over a screen or in an ordinary log washer. This means a minimum amount of water and a maximum amount of ore per cubic yard of raw dirt. The three general classes into which the east Texas iron ores were divided by Kennedy, in the publication already referred to, viz., laminated, concretionary and conglomerate, may be accepted in a broad way, although these three classes may be present in the same locality. So far as the analyses now available are concerned, the concretionary ores are of decidedly better quality than the laminated ores, and these in turn are better than the conglomerate ores. But few of the conglomerate ores now appear to be worth working.

The overburden in the best districts is light and it is probable that a steam shovel would operate to less advantage than ploughs, scrapers and pick-and-shovel. We are inclined to think that a steam shovel will not prove to be the most economical method of handling the greater part of the material in many of the ore districts. It will doubtless find its use here and there, but by no means to the extent now to be seen in Alabama, Georgia, Tennessee and Virginia. In this connection the reader will find an excellent paper in Bulletin No. 56 of the American Institute of Mining Engineers, New York, August, 1911, prepared by H. S. Geismer, Chattanooga district manager of the Southern Iron & Steel Company.

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Freight Rates on Ore, Coal and Coke

Valley Manufacturers File a Petition at Washington Asking Reductions

The seventeen iron and steel manufacturing companies in the Mahoning and Shenango Valleys whose representatives on November 21 conferred in New York with officers of the railroads with which they do business, urging a reduction in freight rates, have carried their contention before the Interstate Commerce Commission. As already noted in these columns, the railroads denied the request of the shippers for a reduction in the freights on iron ore, coal and coke. Three petitions were filed at Washington last week, two being against the Pittsburgh & Lake Erie Railroad Company, dealing respectively with the rate of 70 cents on coal from the Pittsburgh district to Valley points and with the $1.35 rate on coke from the Connellsville district to the Youngstown district. The third petition is against the Lake Shore & Michigan Southern Railway Company and the Pittsburgh & Lake Erie Railroad Company, and relates to the rate of 56 cents on iron ore from Ashtabula Harbor to Youngstown, New Castle and other points. The consumption of raw materials by the iron and steel industries of the Valleys is given as follows:

Coal, about 6,000,000 tons a year, of which 1,750,000 tons is consumed in the plants of the complainants.

Coke, about 6,000,000 tons a year, of which 3,500,000 tons is consumed in the plants of the complainants.

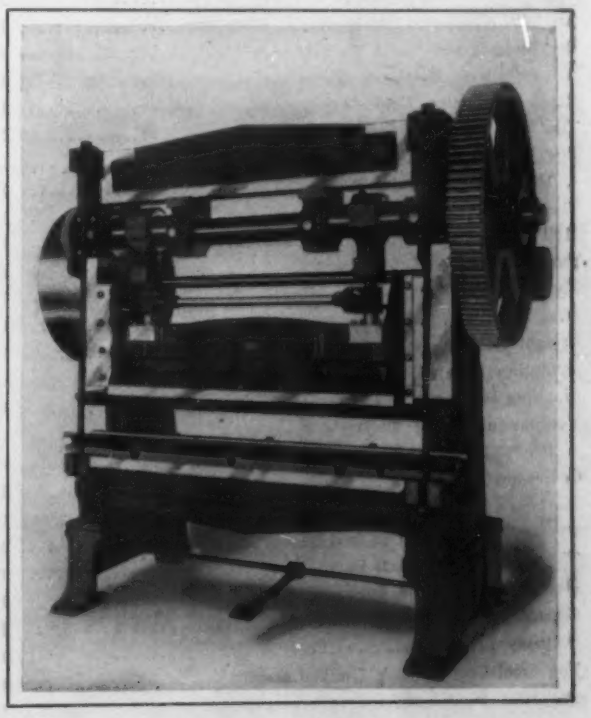
Iron ore, "under normal business conditions," 10,654,000 tons a year, of which 5,800,000 tons is consumed in the plants of the complainants.

It is alleged that the freight rates as mentioned above are "unjust, unreasonable, excessive, exorbitant and unlawful" and work a prejudice and injury to the several complainants. The Interstate Commerce Commission is asked to fix "a just and reasonable charge" on iron ore, coal and coke to the plants of the complainants and to order reparation by the railroads to each of them. The list of complaining companies is as follows:

Youngstown Sheet & Tube Company, Republic Iron & Steel Company, DeForest Sheet & Tin Plate Company, Sharon Steel Hoop Company, Valley Mold & Iron Company, Sharpsville Furnace Company, Girard Iron Company, Brier Hill Iron & Coal Company, Youngstown Steel Company, Struthers Furnace Company, Ohio Iron & Steel Company, Andrews & Hitchcock Iron Company, Empire Iron & Steel Company, Thomas Steel Company, Shenango Furnace Company, Youngstown Iron & Steel Company, Stewart Iron Company, Ltd.

Guillotine Type of Power Punching Press

The Frank L. Wells Company, Kenosha, Wis., builder of spring bed machinery, includes in the line of tools it manufactures three sizes of guillotine-type straight line multiple power punching presses. These presses vary in weight from 6000 to 18,000 lb., the accompanying illustration presenting the machine of largest size. The weight and general design of these machines adapt them particularly to light work such as required in fabricating the parts for iron beds. The work of the machine is especially that



Multiple Power Punching Press Built by Frank L. Wells Company, Kenosha, Wis.

of punching angles and flats and may include riveting. Work up to 72 in. centers is within the capacity of the largest presses.

The housings of the press are built-up cast iron frames, the top and bottom die beds being steel castings. The main shaft has four bearings which provide a journal on either side of each crank. The frames are heavily ribbed and the design provides for liberal bearing surfaces, heavy gears and accurate adjustment for the cross head and Pitman bearing, affording proper take-up for wear.

The Illinois Steel Company blew out its No. 4 Joliet furnace December 31. Two South Chicago furnaces were blown out early in December.

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CONTENTS.

Casting Steel and Alloys in a Vacuum 119
The Philadelphia Foundrymen's Association 124
New 32-In. Gear Turning Lathe 125
Plant of the Best Manufacturing Company 126
The Pollak Steel Company's Axles and Forgings 130
Further Scullin-Gallagher Company Improvements 130
New Henry & Wright Drilling Machines 131
German Productive Expansion 131
Improvement in the Quality of American Steel 132
An 8-Ft. Cincinnati Boring Mill 133
British Iron and Metal Markets in 1911 134
An Improved Ferracute Press 135
Rapid Production Cold Saw 136
The New Iron and Steel Tariff Bill 137
The Whitney Silent Chain 137
A Heavy Single-Crank Press 138
The Newark Foundrymen's Association 138
Mail Drilling and Reaming Machine 139
Punch Press with Safety Device 140
The New Yale & Towne Building 140
Iron and Steel Making in Texas—II 141
Freight Rates on Ore, Coal and Coke 143
Guillotine Type of Power Punching Press 143
Clouding the Labor Union Issue 144
Ventilation One of To-Day's Problems 145
A Profit-Sharing Plan with Unusual Features 145
Correspondence 146
Baltimore Bridge Company Optioned to Carnegie Steel Company 146
Production of Iron Ore in 1911 146
The New Colonial Blast Furnace 146
Heavy Sales of Iron Ore 147
Copper Production and Stocks 147
Obituary 147
The Steel Corporation's Unfilled Orders 147
Pig Iron Production 148
The Museum of Safety's Medal Awards 149
A Large Order for Oil Heating Furnaces 149
The Iron and Metal Markets 150
Personal 160
English Pig Iron Warrants Decline 160
The Politico-Economic Side of Steel Making 161
Foreign Competition for Large Pipe Contract 163
Beneficiating Lake Superior Ores 163
Pittsburgh and Vicinity Business Notes 164
The Watertown Arsenal Labor Trouble 165
The Connellsville Coke Trade in 1911 170
Battleship and Armor Plate Bids 170
The Boiler Manufacturers' Convention 170
President Farrell on the Outlook 170
The Steel Corporation Profit Sharing 170
Annual Meeting of Rogers, Brown & Co. 170
The Machinery Markets 171
Trade Publications 179

Clouding the Labor Union Issue

Taking the McNamara confessions as their text, a group of university men and so-called economists and sociologists who were attending the National Economic and Sociological Associations at Washington presented a communication to President Taft on December 30 favoring a federal commission on industrial relations. The signers of the petition seem to regard the Los Angeles dynamiting as an epoch-making affair, and the McNamara case as one of those crises which call a nation to action. We are told that "there is profound restlessness among large groups of labor who feel that there are no organic ways open through which they can act collectively with respect to the things that most concern them—that they are thwarted when they get together for common strength, and when, not as mutual benefit societies, but as aggregations of men, they set out to mind their business." The slowness with which the legislative proposals of labor unions are enacted into laws is spoken of as the "dead center of the social machinery," which is contrasted with "the speed at which it acts to prevent picketing and rioting during strikes." We learn further that "the workingman sees the club of the officer, the bayonet of the militia directed against him in the defense of property, and he believes that the hand of the law, strong in the protection of property, often drops listless whenever measures are proposed to lighten labor's heavy burden"—and more of that familiar rhetorical ilk.

A good many interrogations are contained in the communication, some of them indicating a highly wrought state of mind. For example, referring to the channels open to American workmen who seek to better their condition through collective effort, it is asked, "Are the American people prepared to counsel violence as the method to be employed—force, dynamite, intimidation?" Then we learn that the answer is No, and that it was given at Los Angeles. But further on we find that "the criminal court is not a sufficient instrument through which the democracy can address itself to the economic struggle"; that while it is well to indict those "who have carried dynamite across State boundaries, we want light along a more crucial boundary line —the borderland between industry and democracy; light on that larger lawlessness which is beyond the view of the criminal court," etc., etc.

The upshot of the communication is that what is wanted is a federal commission to investigate conditions of labor, to review court decisions on the boycott, the picket, the injunction and the strike; to go into the relations of trade unions and employers' associations; also to report on the work of federal and state labor bureaus and to study joint arbitration boards and other machinery for collective bargaining.

With all the stress under which these petitioners of the President were laboring, their rhetoric is not so hysterical as to leave any doubt of their intention to turn the McNamara affair to the account of unionism in one way or another. Just how a criminal conspiracy involving wholesale murder and dynamiting of property should make an issue of "the problems of democracy in its industrial relationships" it is not easy to see. In about the same way a federal commission might have been invoked following the Haymarket murders of the Chicago anarchists. The sociological temperament found there a limitless field for investigation; the average, everyday citizen saw in it a thing to be put down

with all the power of the law. In more recent years in New York there arose a leader in violence in the structural trades—a man named Parks. He and his co-conspirators might have made excellent subjects for a Congressional investigation; but instead the machinery of the law was set in motion in the old-fashioned way and Parks was landed in a prison cell.

As a diversion of public attention from the dynamite policy of high union officials, a federal investigation of industrial relations might prove a success. But there will be little patience with such academic declarations as that "the criminal court is not a sufficient instrument through which the democracy can address itself to the economic struggle." Just at this time the one thing to which the democracy needs most to address itself is to compel labor leaders to respect the laws protecting life and property. Their preaching of lawlessness and of contempt for courts is responsible more than anything else for the existing distrust of militant unionism as a "sufficient instrument" of real progress toward better relations of employers and employees.

No new issue has been raised by the Los Angeles dynamiting. If it be true, as the petition of the sociologists asserts, that "serious distrust has come to be felt by great masses of workers toward the fabric of our law," they should at least be left in no doubt about the certainty of its enforcement against plain murder and criminal conspiracies to destroy property.

Ventilation One of To-Day's Problems

One of the important developments of the next few years will lie along the line of adjustment of ideas regarding ventilation. The importance of the subject is sometimes overlooked, doubtless in part because of the comparatively small amount of money involved in ventilating projects as compared with other engineering work. If we are wrong in assuming that we must provide for the school child at least 30 cu. ft. of outside air per minute and that a positive supply is not essential, or that 5, 10 or 20 cu. ft. may suffice, or perchance that we may need 50 or 100 cu. ft. per minute, the economical importance of the question and the direct interest to every one because of its hygienic phase are apparent. The aggressive attitude taken of late by physicians, physiologists and pedagogists has placed the ventilating engineer on the defensive, however unfair the situation is.

The engineer has been a signal success in contriving to maintain the conditions demanded by the doctor. The medical authorities are legion who have dilated on the necessity of employing the carbon dioxide content of the air as an index of the concomitant impurities exhaled by the human being. Elaborate experiments were made to ascertain the carbonic acid gas production of the human engine, and it remained merely to settle on the desirable dilution of the indoor air to minimize the percentage of carbon dioxide and the accompanying alleged deleterious compounds. Now claims are that present ventilating apparatus is faulty, even discounting, it is presumed, the erratic and irresponsible indifference of the caretaker of the plant.

The new school of ventilating champions is inclined, indeed, to attribute much, if not all, of the success of the so-called open-air school experiments to the outside air itself when the case is far from proved. Instead of there being the one element of direct communication with outside air, as differentiating the open-air school from the ordinary type, there are other factors like the special selected teacher, the attending nurse, special diets and the like, any one of which factors may be of more importance than apprehended. The point is that really unassailable evidence is elusive, and several years' careful investigation will undoubtedly be necessary to give us scientific answers. That something will be done must necessarily result from the agitation which will not down, and which ought not to down, in view of the chance that we have not been proceeding along right lines, and in view of the economical as well as hygienic phases of the question.

A Profit-Sharing Plan with Unusual Features

The principle of profit-sharing in manufacturing works is being adopted in various forms in an increasing ratio every year. Some of the first attempts met with doubtful success, but a better understanding of the several elements which enter into the problem has evolved systems that have operated to the better cooperation of employers and their workmen.

The Dennison Mfg. Company, South Framingham, Mass., has announced to its people a plan of profit sharing in which stock ownership and the ultimate control of the business are promised them. It is an interesting and unusual project. A well-recognized element of the plan is the danger of putting full power into the hands of employees. As time goes on, changes in personnel may produce disastrous results. The Dennison Company proposes to place the responsibility of maintaining a wise management upon the principal workers, and offers them a reward commensurate with their collective and individual efforts, but makes this reward fully contingent upon their performing their whole obligation to the present owners of the capital invested in the business, at the same time (and this is the fundamental principle of the system) providing as a penalty for unwise management the loss of control.

The new corporation divides its securities between first preferred, second preferred and industrial partnership stock. The $4,500,000 of first preferred is issued in payment for the property and assets, and receives 8 per cent cumulative dividends. Second preferred stock, the first series of which is $50,000, may be issued only in exchange for industrial partnership stock where those securities are automatically called in when employees end their connection with the business; or for cash or property.

The first issue of industrial partnership stock is for cash to employees of the original company. After dividends are paid on the first and second preferred stocks, the latter carrying 6 per cent dividends, and after certain deductions are made for depreciation and a "suspense account," earnings will be divided among employees as extra remuneration for their services, in proportion to their earnings during such calendar year, and their length of service, namely: "At least seven years' service and remuneration of at least $1,200, or at least six years' service and remuneration of at least $1,500, or at least five years' service and remuneration of at least $1,800." Provision is made for the compulsory surrender of this stock, in exchange for cash or second preferred stock, at the option of the directors, upon the termination of employment.

Until industrial partnership stock to the amount of

$1,000,000 has been issued, the voting power will vest in first preferred and industrial partnership stock together, each share of first preferred being entitled to one vote, and industrial partnership stock to one vote for each 10 shares, the reason for this being that the par value of the preferred is $100 and of the industrial partnership $10. When industrial partnership stock to the amount of $1,000,000 has been issued, the entire voting power of stockholders will vest in holders of industrial partnership stock with the following proviso taken from the articles of association:

If for any 12 months, dividends on first preferred average less than 4 per cent. per annum, except in case of destruction of any substantial part of the manufacturing plant by fire, earthquake, or other natural calamity, or if for any 24 months such dividends average less than 6 per cent. per annum, then holders of first preferred stock shall have sole voting power of stockholders, but without power to alter or amend this agreement, except by vote of two-thirds of each class of stock outstanding; but, when full obligations to first preferred shall have been again earned and paid (figuring minimum depreciation as provided), voting power shall revert to holders of industrial partnership stock, and the original plan shall be carried on, unless meanwhile sole voting power shall have finally vested in first preferred stockholders as provided in the following paragraph.

If for any 36 months such dividends average less than 7 per cent. per annum, or if in any period of four years the company shall not have paid all cumulative dividends in full, so that there shall be no dividend or part of any dividend in arrears, then sole voting power shall vest at the next annual meeting and thereafter remain in first preferred stockholders.

Thus, the holders of the several classes of stock are safeguarded. If the employees who are managing the properties as stockholders and directors prove inadequate to their task, their power is withdrawn automatically and the preferred stockholders receive back their great plant. If dividends fall off because of dull times, the "older statesmen" of the preferred stockholders enter into the active direction of affairs. The business is a very large one, and the experiment will be watched with much interest by owners of other industrial properties.

Correspondence

Texas Ore for Atlantic Seaboard Furnaces

To the Editor: Having examined professionally the iron ores of Northeastern Texas, I can confirm what Dr. Wm. B. Phillips says in your issue of January 4 as to their quantity, quality and cheap mining. I think he is in error, however, on the economic question of location and character of plant.

With an ore rate of not over $1 per ton, the advantages of the tidewater by-product scheme, with the additional advantages of tidewater location for marketing the surplus product, seem very great. In fact, I believe the ore can be smelted at Chester, Pa., to better advantage than with a coke furnace located in Northeastern Texas.

GRAHAM MACFARLANE.

LOUISVILLE, KY., January 6, 1912.

Production of Iron Ore in 1911

Preliminary estimates of iron ore sold in 1911 were sent to the Geological Survey by 26 of the largest iron-mining companies in the United States at the close of the year. The combined output of these companies represents more than 80 per cent. of the total production of the United States. From these returns it is estimated by E. F. Burchard, of the survey, that the total quantity of iron ore marketed in the United States in 1911, not including stocks left at the mines, was between 43,000,000 and 46,000,000 gross tons. This quantity represents a decrease of 22 to 24 per cent. of the sales for 1910, which aggregated 56,889,734 tons.

The output for 1910 was the largest quantity of iron ore ever marketed in a single year in the United States, and according to the present estimate the quantity produced in the year 1911 will take fifth place, being exceeded by that of 1910, 1907, 1909 and 1906 in the order named.

The New Colonial Blast Furnace

The starting up of the new furnace of the Colonial Iron Company at Riddlesburg, Pa., December 7 marked the completion of notable improvements both as regards the furnace and its equipment. The old stone alternate stacks, the first of which was built 44 years ago (1868), have been replaced by a modern stack designed to produce 300 tons of pig iron per day. Its dimensions are 75 ft. x 18 ft. bosh and 12 ft. hearth. The equipment newly installed includes a modern inclined hoist with double skip, a revolving hopper, electrically operated cars for filling the skip and a complete bin system. New boilers have been added, and there has also been installed a General Electric Company turbine blower designed to deliver 25,000 cu. ft. of free air per minute at a pressure of 25 lb. per sq. in. Another improvement is an electric plant for power and lighting. Frank C. Roberts & Co., Philadelphia, had the engineering and construction contract. The Colonial Iron Company operates its own coal mines and cokes its coal; also operates its own limestone quarry and mines from its own property a large proportion of the ore it uses. Henry H. Adams, Jr., is president of the company, and the New York offices are at 149 Broadway.

Baltimore Bridge Company Optioned to Carnegie Steel Company

The Baltimore Bridge Company, Baltimore, Md., has optioned its land, buildings, machinery and tools to the Carnegie Steel Company, Pittsburgh. The property includes 11 acres of ground, having thereon a steel bridge shop and a number of other large steel buildings. The Baltimore Bridge Company succeeded the Structural Iron & Steel Company, which was previously known as the Standard Iron Company, and has been in existence about seven years. The Carnegie Steel Company states that if the purchase is made a large warehouse will be erected on the ground not now occupied by buildings, while the bridge plant will probably be operated by the American Bridge Company. The warehouses would then be used by the Carnegie Company to make direct deliveries to its customers in the locality and also for making foreign shipments from stock, Baltimore being a very desirable port for this purpose. The matter of the purchase of the plant will likely be definitely decided within a short time.

The Brown-Wales Company, iron and steel merchant, 69 to 83 Purchase street, Boston, Mass., gave a luncheon to its office men and salesmen on the afternoon of December 30. The number of participants was about 25. It was served in one of the company's offices, and was followed by remarks from several of those present. This custom has been followed for the past five or six years, and it is found to be fruitful of good results thus to get the men together at least once a year.

The Pittsburgh Crucible Steel Company's No. 2 blast furnace, at Midland, Pa., of which James Duane, Jr., is superintendent, made the largest daily, weekly and monthly production in the history of the plant in December, 1911. The month's production was 14,901 tons, and the largest daily production was 604 tons, on Christmas day, all standard basic pig iron. The furnace is now on its sixth year on one lining.

The Western Steel & Foundry Company, owned by the Pressed Steel Car Company, will, it is stated, exercise its option for the purchase of the Illinois Car Equipment Company, located at Hegewisch, Ill., for $1,109,000.

D. C. & Wm. B. Jackson have removed their Chicago engineering offices to the Harris Trust Building, 111 West Monroe street.

Heavy Sales of Iron Ore

Large Newfoundland and Swedish Contracts, the Latter for 15,000,000 Tons

The Nova Scotia Steel & Coal Company, Ltd., has sold to German consumers some 225,000 tons of its Wabana or Newfoundland iron ore for delivery during 1912. This has been for the most part at a price equal to 7 cents a unit in the Philadelphia market. The company has also closed a contract through its European representatives, Wm. Jack & Sons, for 250,000 tons of ore to go to German consumers, deliveries ranging over five years. This company estimates its yearly output at 450,000 tons, which it usually divides between the European and United States markets. For 1912 shipment its usual allotment for Europe has been sold, while 135,000 tons has been contracted for in this country, largely in the Philadelphia territory. A good share of this has been in the nature of deferred deliveries, with additions to fill out the year's requirements. Between 75,000 and 100,000 tons remains to be sold in this market, and will probably be contracted for in the coming month. The price for 1912 is 7 cents a unit, at Philadelphia. Any unsold portions of the customary allotment for consumption in this country will be disposed of abroad.

Eastern users of foreign iron ore are much interested in the report current in the past week, and which we have been able to confirm, that 15,000,000 tons of Swedish iron ore has been sold to German consumers. This has been divided into contracts running for various terms—1, 5, 10 and 15 years. The ore was sold largely at 50 cents a ton more at the mine than the price obtained for similar Swedish ores in this country. Negotiations for these large purchases were entered into shortly after the sale of 3,000,000 tons of Swedish ore to the Bethlehem Steel Company, for delivery over a term of nine years, and have been but recently concluded.

The amount of Swedish ore sent to this country in 1912 will probably not exceed 350,000 to 400,000 tons, as difficulty is experienced in obtaining charters to bring over the quantity already contracted for. A few cargoes are available, it is said, for early delivery, but forward business is not now being considered by the Swedish producers.

Copper Production and Stocks

The Copper Producers' Association has issued the following statistical statement for the year 1911, all quantities being in pounds:

Months.	Stock at beginning of month.	Production.	Deliveries	For domestic consumption. / For export.		Change in stock.
Jan.	122,030,195	113,696,591	95,287,296	42,078,557 / 53,208,739	I.	20,409,295
Feb.	142,439,490	109,828,297	95,630,017	50,518,998 / 45,111,019	I.	14,198,280
Mar.	156,637,770	130,532,080	125,161,916	66,080,789 / 59,081,127	I.	5,370,164
Apr.	162,007,934	118,085,223	114,537,249	52,407,650 / 62,129,599	I.	3,547,974
May	165,555,908	126,962,544	126,522,520	64,543,963 / 61,978,557	I.	440,024
Jun.	165,995,932	124,554,312	133,116,080	61,655,561 / 71,460,519	D.	8,561,768
Jul.	157,434,164	112,167,934	131,863,240	56,982,582 / 74,880,658	D.	19,695,306
Aug.	137,738,858	125,493,667	129,791,024	59,935,364 / 69,855,660	D.	4,297,357
Sep.	133,441,501	115,588,950	108,135,595	57,311,584 / 50,824,011	I.	7,453,355
Oct.	140,894,856	118,255,442	124,152,656	64,068,307 / 60,084,349	D.	5,897,214
Nov.	134,997,642	111,876,601	135,089,055	68,039,776 / 67,049,279	D.	23,212,454
Dec.	111,785,188	122,896,697	145,227,190	65,988,474 / 79,238,716	D.	22,330,493

The total production for the year is placed at 1,431,938,336 lb. and the total deliveries at 1,464,513,838 lb., making the deliveries exceed the production by 32,575,500 lb.

The stock on hand January 1 was 89,454,695 lb., the December reduction in stock having been 22,330,493 lb. The stock is now at the lowest point since the organization of the association three years ago.

Hickman, Williams & Co., Cincinnati, pig iron merchants, with branches in other large centers, have been appointed exclusive sales agents for the Jackson Iron & Steel Company, Jackson, Ohio, to cover territory contiguous to the following cities: Cincinnati, Pittsburgh, Detroit, Chicago, Louisville and St. Louis. The Jackson Company is a producer of high silicon iron and Bessemer ferrosilicon.

Obituary

Richard T. Crane

Richard T. Crane, president of the Crane Company, Chicago, died January 8, after a brief illness, aged 80 years. He was born in Paterson, N. J., and worked in machine shops in Paterson, Brooklyn and New York City until he was 23 years old, when he moved to Chicago. An uncle, Martin Ryerson, gave him a small piece of land there, and he started a brass foundry. His brother, Charles S. Crane, subsequently joined him, and the firm of R. T. Crane & Brother was formed, beginning the manufacture of steam apparatus in 1858. An iron foundry and a more elaborate four-story factory were added in rapid succession. The business was then incorporated as the Northwestern Mfg. Company, and later changed to the Crane Brothers Mfg. Company. At the age of 35 Mr. Crane began the manufacture of freight and passenger elevators, and his business, as the Crane Elevator Company, grew to very large proportions, with branch factories in many Western cities, and having a list of 700 different kinds of iron and steel manufactured articles.

Mr. Crane was greatly opposed to universities and higher educational institutions, and some years ago tried to stop the State of Illinois from appropriating additional funds for Chicago University. He also described the Carnegie Technical Schools in Pittsburgh as a "$12,000,000 blunder." He contributed, on the other hand, $200,000 a year for manual training instruction in Chicago. He often asserted that after a boy had had a public school course, full of manual training subjects, with perhaps a short shop course later, he had had enough education. He was twice married. His son, Charles R. Crane, is first vice-president of the Crane Company, and another son, R. T. Crane, Jr., is second vice-president.

HARRISON T. CHANDLER, president of the Chandler & Price Company, Cleveland, manufacturer of printing presses, died in that city January 1, aged 71 years. He was born at Chandlerville, Ill., and was engaged in banking there until 1881, when he bought an interest in the Cleveland Type Foundry. In 1884 the firm of Chandler & Price was formed, and the corporation succeeded it in 1895, Mr. Chandler being made president. The business has been developed into one of the important industries of Cleveland.

THOMAS A. GALT, Sterling, Ill., the founder of the Keystone Works of the International Harvester Company, died January 1 of heart failure, aged 84 years. He was the originator of many improvements in agricultural machinery. He was at one time mayor of his city, and in later years was a director of the McCormick Theological Seminary, Chicago.

The Steel Corporation's Unfilled Orders

The statement of the United States Steel Corporation's unfilled orders given out January 10 showed the surprising total of 5,084,761 tons on December 31, 1911, as compared with 4,141,955 tons on November 30. This represents an increase of 942,806 tons last month, as against an increase of 447,627 tons in November. The total for December 31 is the largest since that of March 31, 1910, which was 5,402,514 tons. The low point in the unfilled tonnage records of the corporation was 2,674,757 tons, shown in the report for December 31, 1910. The amounts reported for the various months of last year are as follows:

Dec. 31, 1911	5,084,761	June 30, 1911	3,361,058
Nov. 30, 1911	4,141,955	May 31, 1911	3,112,187
Oct. 31, 1911	3,694,328	April 30, 1911	3,218,704
Sept. 30, 1911	3,611,317	Mar. 31, 1911	3,447,301
Aug. 31, 1911	3,695,985	Feb. 28, 1911	3,400,543
July 31, 1911	3,584,085	Jan. 31, 1911	3,110,919

The totals at the close of the various years have been as follows: 1902, 5,347,523 tons; 1903, 3,215,123 tons; 1904, 4,696,203 tons; 1905, 7,605,086 tons; 1906, 8,498,719 tons (the high record); 1907, 4,624,552 tons; 1908, 3,603,527 tons; 1909, 5,927,031 tons; 1910, 2,674,757 tons.

The Scottdale (Pa.) furnace of Corrigan, McKinney & Co. was blown in January 1. It had been out since October 15.

Pig Iron Production

December Rate Slightly Less

January Starts with Active Capacity 1000 Tons More than on December 1

The rate of pig iron production throughout December, a month full of the talk of improvement in the iron trade, was somewhat less than in November, the total beng 2,043,270 tons, or 65,912 tons a day of coke and anthracite iron, against 1,999,433 tons in November, or 66,648 tons a day. The steel works furnaces fell 1500 tons a day below their rate in November, while the merchant furnaces increased about 800 tons a day. Nine furnaces blew out and 11 blew in in the month, so that 214 were active January 1, with a daily capacity of 67,642 tons, against 66,609 tons for 212 furnaces on December 1. The gain of over 1000 tons for a net increase of but two furnaces is due to the fact that the average caliber of furnaces blowing in was greater than that of furnaces blowing out.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, beginning with December, 1910, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons.

	Steel works.	Merchant.	Total.
December, 1910	35,909	21,440	57,349
January, 1911	36,401	20,351	56,752
February	42,349	21,741	64,090
March	48,970	21,066	70,036
April	47,805	21,031	68,836
May	42,270	18,809	61,079
June	42,708	16,877	59,585
July	42,472	15,369	57,841
August	47,120	15,030	62,150
September	49,696	16,207	65,903
October	50,351	17,460	67,811
November	48,430	18,218	66,648
December	46,885	19,027	65,912

Output by Districts

The table below gives the production of all coke and anthracite furnaces in December and the four months preceding:

Monthly Pig Iron Production—Gross Tons.

	August. (31 days)	Sept. (30 days)	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)
New York	118,145	114,418	122,680	122,051	126,687
New Jersey	.....	.....	.....	.....	.....
Lehigh Valley	77,021	81,728	85,958	78,379	73,085
Schuylkill Valley	53,397	52,546	55,716	59,058	68,373
Lower Susquehanna and Lebanon Val.	38,741	36,687	37,687	40,158	39,818
Pittsburgh district	469,012	482,013	529,872	478,623	474,266
Shenango Valley	84,884	82,879	92,997	95,205	99,483
West. Penn.	96,366	98,324	101,030	87,689	103,138
Maryland, Virginia and Kentucky	46,262	49,243	55,768	51,659	48,501
Wheeling district	94,476	92,130	100,529	91,172	104,549
Mahoning Valley	189,200	213,872	228,248	208,991	210,903
Central and North Ohio	131,850	131,020	135,004	137,796	141,341
Hocking Valley, Hanging Rock and S. W. Ohio.	7,262	16,785	24,750	22,089	23,680
Chicago district	287,875	289,198	288,581	288,274	268,362
Mich., Minn., Mo., Wis., Col., Wash.	63,114	61,276	68,064	58,398	73,707
Alabama	140,879	149,238	150,219	153,901	161,884
Tenn., Georgia and Texas	28,153	25,745	25,044	25,990	25,493
Total	1,926,637	1,977,102	2,102,147	1,999,433	2,043,270

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons.

	Pig.—Total production—			Spiegeleisen and ferromanganese.	
	1909	1910	1911	1910	1911
January	1,117,823	1,773,201	1,128,448	19,538	8,360
February	1,073,363	1,620,539	1,185,782	21,396	12,821
March	1,140,553	1,739,212	1,518,063	25,591	11,784
April	1,093,092	1,669,898	1,434,142	22,304	10,657
May	1,356,448	1,619,283	1,310,378	26,529	13,641
June	1,365,527	1,549,112	1,281,241	27,680	22,611
July	1,508,762	1,462,689	1,316,646	22,924	17,067
August	1,591,991	1,442,572	1,460,610	25,756	14,579
September	1,660,839	1,410,221	1,490,898	15,151	17,757
October	1,769,094	1,419,624	1,560,884	8,500	19,697
November	1,689,994	1,242,804	1,452,907	9,032	19,678
December	1,768,799	1,113,174	1,453,446	12,178	20,698

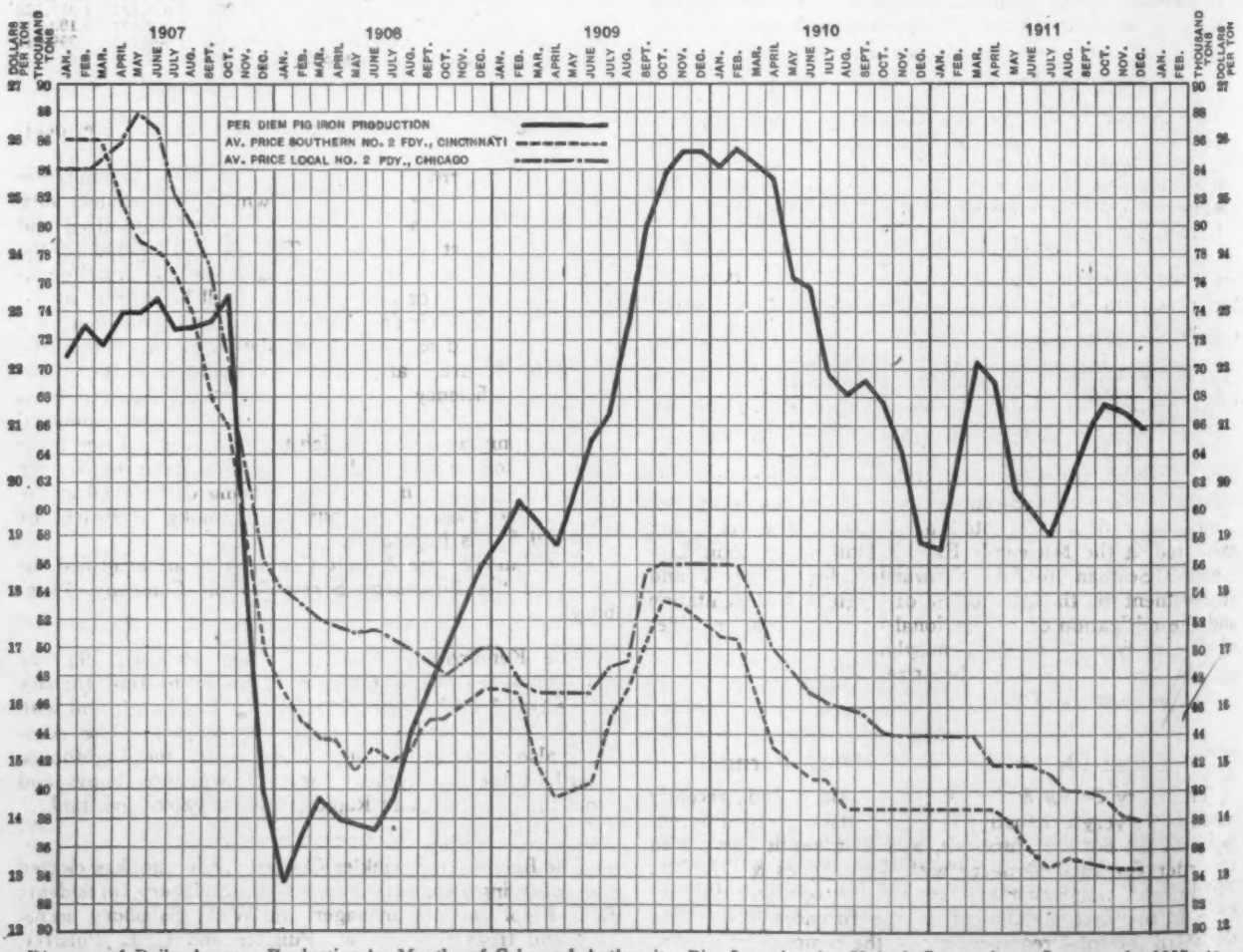

Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to January 1, 1912; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Capacity in Blast January 1 and December 1

The following table shows the daily capacity of furnaces in blast January 1 and December 1:

Coke and Anthracite Furnaces in Blast.

Location of Furnaces.	Total number of stacks.	Jan. 1 Number in blast.	Jan. 1 Capacity per day.	Dec. 1 Number in blast.	Dec. 1 Capacity per day.
New York:					
Buffalo	17	10	3,480	10	3,466
Other New York	7	3	610	3	602
New Jersey	7	0	0	0	0
Pennsylvania:					
Lehigh Valley	22	10	2,260	11	2,444
Spiegel	3	1	100	1	101
Schuylkill Valley	16	8	2,205	8	2,020
Lower Susquehanna	7	2	526	2	610
Lebanon Valley	10	5	759	5	775
Pittsburgh District	50	35	15,142	36	15,206
Spiegel	3	3	480	2	314
Shenango Valley	20	11	3,609	10	3,173
Western Pennsylvania	27	15	3,715	12	3,083
Maryland	4	2	563	2	587
Wheeling District	14	9	3,373	9	3,240
Ohio:					
Mahoning Valley	24	19	7,613	17	6,605
Central and Northern Hock'g Val., Hang'g R'k, & S. W. Ohio	23	12	4,742	11	4,593
Illinois	15	6	920	6	877
Spiegel	31	19	8,250	22	9,375
Mich., Wis. and Minn.	2	2	155	2	240
Colorado, Mo. and Wash.	10	5	1,218	5	962
The South:	8	3	940	4	1,240
Virginia	23	6	810	5	740
Kentucky	5	1	128	2	360
Alabama	46	20	5,222	20	5,130
Tenn. and Georgia	20	7	822	7	866
Total	414	214	67,642	212	66,609

Nine furnaces were blown out in December. These include Keystone in the Lehigh Valley, Hall in the Shenango Valley, Norton in Kentucky, one Joliet and two South Chicago in Illinois, one Colorado, Zenith in Minnesota, and Detroit Furnace Company in Michigan.

Among furnaces blown in last month or on January 1 were New Castle No. 1 and South Sharon No. 2 in the Shenango Valley, Colonial, Punksutawney and Scottdale in western Pennsylvania, West End on Virginia, two Ohio in the Mahoning Valley, Dover in Ohio, Lawrence in the Hanging Rock district and one Zug Island at Detroit.

Chart of Pig Iron Production and Prices

The fluctuations in pig iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The two sets of figures are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.

	1907.	1908.	1909.	1910.	1911.
January	71,149	33,918	57,975	84,148	56,752
February	73,038	37,163	60,976	85,616	64,090
March	71,821	39,619	59,232	84,459	70,036
April	73,885	38,289	57,962	82,792	68,836
May	74,048	37,603	60,753	77,102	61,079
June	74,486	36,444	64,656	75,516	59,585
July	72,763	39,287	67,793	69,305	57,841
August	72,594	43,851	72,546	67,963	62,150
September	72,783	47,300	79,507	68,476	65,903
October	75,386	50,554	83,856	67,520	67,811
November	60,937	51,595	84,917	63,639	66,648
December	39,815	56,158	85,022	57,349	65,912

Monthly Average Prices in Dollars of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry at Chicago District Furnace Since January, 1907.

	1907.		1908.		1909.		1910.		1911.	
	Sou. No.2, Cin.	Loc. No.2, Chi.	Sou. No.2, Cin.	Loc. No.2, Chi.	Sou. No.2, Cin.	Loc., No.2, Chi.	Sou. No.2, Cin.	Loc. No.2, Chi.	Sou. No.2, Cin.	Loc. No.2, Chi.
Jan.	26.00	25.00	16.15	18.10	16.26	17.00	17.25	18.50	14.25	15.00
Feb.	26.00	25.50	15.75	17.81	16.13	16.40	17.06	18.50	14.25	15.00
Mar.	26.00	25.75	15.50	17.50	15.05	16.15	16.30	17.80	14.25	15.00
Apr.	25.06	26.00	15.20	17.38	14.25	16.15	15.37	17.00	14.25	15.00
May	24.25	26.50	14.75	17.28	14.50	16.15	15.00	16.56	14.00	15.00
June	24.10	26.25	15.25	17.38	14.70	16.15	14.85	16.25	13.50	15.00
July	23.85	25.20	15.00	17.20	15.75	16.65	14.75	16.06	13.25	14.87
Aug.	23.00	24.50	15.25	17.00	16.38	16.78	14.31	16.00	13.45	14.50
Sept.	21.50	23.75	15.65	16.70	17.35	18.35	14.25	15.90	13.31	14.50
Oct.	20.95	22.10	15.75	16.50	17.88	18.50	14.25	15.56	13.25	14.46
Nov.	19.50	20.31	16.00	16.75	17.75	18.50	14.25	15.50	13.20	14.09
Dec.	17.00	18.55	16.25	17.00	17.45	18.50	14.25	15.50	13.19	14.00

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.

	1907.	1908.	1909.	1910.	1911.
Jan.	2,205,607	1,045,250	1,797,560	2,608,605	1,759,326
Feb.	2,045,068	1,077,740	1,707,340	2,397,254	1,794,509
Mar.	2,226,457	1,228,204	1,832,194	2,617,949	2,171,111
Apr.	2,216,558	1,149,602	1,738,877	2,483,763	2,064,086
May	2,295,505	1,165,688	1,883,330	2,390,180	1,893,456
June	2,234,575	1,092,131	1,930,866	2,265,478	1,787,566
July	2,255,660	1,218,129	2,103,431	2,148,442	1,793,068
Aug.	2,250,410	1,359,831	2,248,930	2,106,847	1,926,637
Sept.	2,183,487	1,418,998	2,385,206	2,056,275	1,977,102
Oct.	2,336,972	1,567,198	2,599,541	2,093,121	2,102,147
Nov.	1,828,125	1,577,854	2,547,508	1,909,780	1,999,433
Dec.	1,234,279	1,740,312	2,635,680	1,777,817	2,043,270

The Museum of Safety's Medal Awards

The American Museum of Safety will hold its second annual meeting on the evening of January 18 in the auditorium of the Engineering Societies Building, 29 West Thirty-ninth street, New York. On this occasion Prof. F. R. Hutton, chairman of the jury of awards, will present three gold medals as follows: Travelers' Insurance medal, to the Pennsylvania Railroad Company; Scientific American medal, to the Norton Company, Worcester, Mass., and the Louis Livingston Seaman medal.

The Travelers' Insurance medal is awarded to the American employer who, in the judgment of the American Museum of Safety, has done the most for the protection of the lives and limbs of his workmen by means of safety devices for dangerous machines and processes. The Scientific American medal is awarded to the most efficient safety device invented in the last three years and exhibited at the Museum's Exhibit Hall. The Louis Livingston Seaman medal is awarded for progress and achievement in the promotion of hygiene and sanitation and the mitigation of occupational disease. Lantern slides of the safety work of the Pennsylvania Railroad Company and the Norton Company, the prize winners, will be shown by Dr. William H. Tolman, director of the museum.

A Large Order for Oil Heating Furnaces

The Gary Screw & Bolt Company, Gary, Ind., recently made some very exhaustive tests in Pittsburgh of different types of oil burning furnaces, and as a result has placed an order for such furnaces with Tate, Jones & Co., Inc., Pittsburgh, amounting to between $30,000 and $40,000. This is the first installment of the furnaces, comprising one-third the total requirements of the company in its new plant, now about completed. It consists of 12 short furnaces for heating bolt stock; three 30-ft. furnaces for continuous rivet machines and 10 large nut and rivet heating furnaces.

All these furnaces will use the Tate-Jones combination fuel oil burner, by the use of which the heaviest oils, containing high heat values, are completely atomized and used to the best advantage. The oil will be fed to the burners under 20 to 25 lb. pressure, and a very small quantity of dry steam or compressed air will be used to atomize the oil. The air for combustion is to be supplied by a blower at 4 to 6 oz. By the regulation of this supply the nature of the fire is always under the control of the operator. The efficiency of the fire cannot be impaired by a careless operator, however, as the burners are equipped with the unit control, by which the movement of one lever turns on both the oil and the necessary steam or dry air for atomizing it. This proportion being determined at the factory and fixed in the burner, a smoky, inefficient or wasteful fire is impossible.

The Gary Screw & Bolt Company is an identified interest of the Pittsburgh Screw & Bolt Company, Pittsburgh.

The Kennicott Company, Chicago Heights, Ill., has just completed the installation of an oil-heating furnace of the type built by Tate, Jones & Co., Pittsburgh, and with capacity for heating 12-ft. plates for flanging. This company also received recently orders from the Lighthouse Board of the Government for eight whistling buoys and from the city of Grand Rapids, Wis., a 150,000-gal. tank.

The Rockwood Sprinkler Company, Chicago, has elected the following officers: Warren M. Salisbury, president; R. S. Ripple, general manager, and W. C. Salisbury, secretary and treasurer. H. M. Pulsifer and C. L. Pulsifer, formerly president and secretary-treasurer, respectively, have retired from active service with the company.

The Iron and Metal Markets

Unfilled Steel Orders

A Large Increase in December

January Business More than Expected—Rail and Car Contracts

While some extravagant predictions of the pace steel works operations would take after January 1 have not been realized, the volume of new business in some important lines has been large. It is more than might have been expected for the first 10 days of a new year, and particularly after the very heavy contracting in December.

The Steel Corporation's statement of unfilled orders December 31, 1911, given out at noon Wednesday, January 10, showing 942,806 tons increase for December, was a surprise even to those who knew in a general way of the large tonnage brought in by the expiring of low-priced options with the end of the old year. The total of unfilled orders at the end of 1911—5,084,761 tons—is the largest since March 31, 1910.

There has been a further increase in steel works operations in the Pittsburgh district. The Steel Corporation ordered three more furnaces blown in in the past week—one each at the Clairton, Mingo and South Sharon groups—making an increase of nine in the number of active furnaces in 30 days.

Rail orders are coming in according to programmes which have already been pretty well advertised. The Great Northern has ordered 36,000 tons and the Northern Pacific 36,000 tons. In each case the Colorado mill got 10,000 tons, the Illinois Steel Company 13,000 tons and the Lackawanna Steel Company about 10,000 tons. The remainder went to the Bethlehem and Pennsylvania Steel Companies. The Delaware & Hudson has placed 12,000 tons of open-hearth rails at South Bethlehem. The New York Central orders will reach 180,000 tons. The Pennsylvania contracts, a total of 150,000 tons, will go out after a conference on specifications now being held in Philadelphia with representatives of the steel companies.

The lull in car-buying, due to vigorous fencing between the railroads and the car companies over the advances the latter have been asking from the low November level, is over. There is reason to think that more business has been done than is announced, but it is known that the Pennsylvania Lines West have just closed for 3200 cars and the Lines East for 4000; the Burlington for 2500, the Great Northern for 1500, and other roads for about 2000. Inquiries are out for 12,000 to 15,000 more.

The efforts to get higher prices for structural steel are attended by the sharpest kind of competition for fabricated work. Independent interests have taken most of the important contracts let in recent weeks. There are evidences in a good deal of the steel work lately let that old options on plain material are being exercised at the lowest prices of last year.

The pig iron market has continued active in the Central West. Considerable new inquiry has come up at Pittsburgh. Prices are firmer and some business in foundry iron has been done at slight advances.

A Pittsburgh steel company has closed for 6000 tons of basic iron at $12.40 at Valley furnace, and another purchase of 12,000 to 15,000 tons was made at $12.25. Valley furnaces are now holding for $12.50.

Our blast furnace statistics show that the production of coke and anthracite iron in December was 2,043,270 tons, or 65,912 tons a day, against 1,999,433 tons, or 66,648 tons a day, in November. Steel works output, at 1,453,000 tons, was practically the same as in November. Nine furnaces were blown out in December and 11 were blown in, the capacity active January 1 being 67,642 tons a day, against 66,609 tons on December 1.

Eastern consumers of foreign iron ores have taken a lively interest in the five-year contract for 250,000 tons a year of Newfoundland iron ores just closed with German steel companies, and especially in the contracts for Swedish ores, extending over 5, 10 and 15 years, and amounting to 15,000,000 tons, recently made by German users. The Bethlehem Steel Company's nine-year contract with the Swedish producers evidently stirred the German companies to action. Freight uncertainties have interfered with a larger use of foreign ores by Eastern furnaces, and these latest developments point to their increasing dependence hereafter upon Lake Superior sources of supply.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Jan. 10, 1912.	Jan. 3, 1912.	Dec. 13, 1911.	Jan. 11, 1911.
Pig Iron, Per Gross Ton:				
Foundry No. 2 standard, Philadelphia	$14.85	$14.85	$14.85	$15.50
Foundry No. 2, Valley furnace	13.00	13.00	13.00	13.75
Foundry No. 2 Southern, Cincinnati	13.25	13.25	13.25	14.25
Foundry No. 2, Birmingham, Ala.	10.00	10.00	10.00	11.00
Foundry No. 2, at furnace, Chicago*	14.00	14.00	14.00	15.50
Basic, delivered, eastern Pa.	14.25	14.25	14.25	14.75
Basic, Valley furnace	**12.50**	12.25	12.25	13.25
Bessemer, Pittsburgh	15.15	15.15	14.90	15.90
Gray forge, Pittsburgh	13.40	13.40	13.40	14.15
Lake Superior charcoal, Chicago	16.00	16.00	16.50	18.00
Coke, Connellsville, Per Net Ton, at Oven:				
Furnace coke, prompt shipment.	1.85	1.85	1.55	1.40
Furnace coke, future delivery	**1.70**	1.65	**1.65**	**1.75**
Foundry coke, prompt shipment.	*1.90*	2.00	1.90	1.90
Foundry coke, future delivery	*2.10*	2.15	2.15	2.25
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh	20.00	20.00	19.00	23.00
Open hearth billets, Pittsburgh	20.00	20.00	19.00	23.00
Forging billets, Pittsburgh	**28.00**	27.00	24.00	28.00
Open hearth billets, Philadelphia	22.40	22.40	21.40	25.40
Wire rods, Pittsburgh	*24.00*	24.50	24.50	28.50
Old Material, Per Gross Ton:				
Iron rails, Chicago	**15.00**	14.75	14.50	14.50
Iron rails, Philadelphia	**16.50**	16.00	15.50	17.00
Car wheels, Chicago	13.25	13.25	13.00	13.00
Car wheels, Philadelphia	12.50	12.50	12.50	13.00
Heavy steel scrap, Pittsburgh	**13.00**	12.50	12.25	13.50
Heavy steel scrap, Chicago	10.50	10.50	10.00	11.50
Heavy steel scrap, Philadelphia	12.25	12.25	12.00	12.50
Finished Iron and Steel, Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.27½	1.27½	1.25	1.32½
Iron bars, Pittsburgh	1.25	1.25	1.25	1.35
Iron bars, Chicago	1.15	1.15	1.15	1.30
Steel bars, Pittsburgh	1.15	1.15	1.10	1.40
Steel bars, tidewater, New York	1.31	1.31	1.26	1.56
Tank plates, Pittsburgh	1.15	1.15	1.15	1.40
Tank plates, tidewater, New York	1.31	1.31	1.31	1.56
Beams, Pittsburgh	1.15	1.15	1.15	1.40
Beams, tidewater, New York	1.31	1.31	1.31	1.56
Angles, Pittsburgh	1.15	1.15	1.15	1.40
Angles, tidewater, New York	1.31	1.31	1.31	1.56
Skelp, grooved steel, Pittsburgh	1.15	1.15	1.12½	1.25
Skelp, sheared steel, Pittsburgh	1.20	1.20	1.20	1.30
Sheets, Nails and Wire, Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	1.90	1.90	1.90	2.20
Wire nails, Pittsburgh	1.55	1.55	1.55	1.70
Cut nails, Pittsburgh	1.50	1.50	1.50	1.60
Fence wire, ann'led, 0 to 9, Pgh.	1.35	1.35	1.35	1.50
Barb wire, galv., Pittsburgh	1.85	1.85	1.85	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Metals, Per Pound:	Jan. 10. 1912. Cents.	Jan. 3, 1912. Cents.	Dec. 13, 1911. Cents.	Jan. 11, 1911. Cents.
Lake copper, New York	14.62½	14.25	13.75	12.75
Electrolytic copper, New York	14.50	14.12½	13.62½	12.50
Spelter, St. Louis	6.35	6.20	6.25	5.40
Spelter, New York	6.50	6.35	6.40	5.55
Lead, St. Louis	4.35	4.35	4.37½	4.35
Lead, New York	4.45	4.45	4.45	4.50
Tin, New York	43.50	44.25	44.35	40.25
Antimony, Hallett, New York	7.60	7.60	7.60	8.00
Tin plate, 100-lb. box, New York	$3.64	$3.64	$3.64	$3.64

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft	1.55
No. chag for cutting rectangular plates to length 3 ft. and over.	

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in. on one or both legs, ¼ in. and over, 1.15c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in	1.20 to 1.25
H-beams over 18 in	1.30 to 1.35
Angles over 6 in	1.20 to 1.25
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909	1.20 to 1.25
Tees, 3 in. and up	1.20 to 1.25
Zees, 3 in. and up	1.15 to 1.20
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909	1.20 to 1.25
Deck beams and bulb angles	1.45 to 1.50
Hand rail tees	2.00 to 2.15
Checkered and corrugated plates	2.00 to 2.15

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.30 to 1.35
Nos. 9 to 10	1.40 to 1.45
Nos. 11 and 12	1.45 to 1.50
Nos. 13 and 14	1.50 to 1.55
Nos. 15 and 16	1.60 to 1.65

Box Annealed Sheets, Cold Rolled.

	One Pass.	Three Pass.
Nos. 10 to 12	1.55 to 1.60	
Nos. 13 and 14	1.60 to 1.65	
Nos. 15 and 16	1.65 to 1.70	1.75 to 1.80
Nos. 17 to 21	1.70 to 1.75	1.80 to 1.85
Nos. 22, 23 and 24	1.75 to 1.80	1.85 to 1.90
Nos. 25 and 26	1.80 to 1.85	1.90 to 1.95
No. 27	1.85 to 1.90	1.95 to 2.00
No. 28	1.90 to 1.95	2.00 to 2.05
No. 29	1.95 to 2.00	2.05 to 2.10
No. 30	2.05 to 2.10	2.15 to 2.20

Galvanized Sheets of Black-Sheet Gauge.

Nos. 10 and 11	1.90 to 1.95
Nos. 12, 13 and 14	2.00 to 2.05
Nos. 15, 16 and 17	2.15 to 2.20
Nos. 18 to 22	2.30 to 2.35
Nos. 23 and 24	2.40 to 2.45
Nos. 25 and 26	2.60 to 2.65
No. 27	2.75 to 2.80
No. 28	2.90 to 2.95
No. 29	3.00 to 3.05
No. 30	3.20 to 3.25

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations:

Corrugated Roofing Sheets Per Square.

Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29	....	$2.30	23	$2.35	$3.45
28	$1.30	2.45	22	2.55	3.65
27	1.45	2.50	21	2.75	4.00
26	1.55	2.60	20	3.00	4.30
25	1.80	3.00	18	4.00	5.65
24	2.05	3.10	16	4.85	6.45

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $24 to $24.50. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carlod lots, to jobbers, annealed, $1.35; galvanized, $1.65. Carload lots, to retailers, annealed, $1.45; galvanized, $1.75. Galvanized barb wire to jobbers, $1.85; painted, $1.55. Wire nails, to jobbers, $1.55.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	1.80	1.85	1.90	1.95	2.05	2.15	2.55	2.65

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911:

Butt Weld.

	Steel—Black.	Steel—Galv.	Iron—Black.	Iron—Galv.
⅛ and ¼ in	74	54	68	48
⅜ in	75	65	69	59
½ in	78	68	72	62
¾ to 1½ in	81	73	75	67
2 to 3 in	82	75	76	69

Lap Weld.

1¼ and 1½ in	..	..	68	61
2 in	79	72	72	65
2½ to 4 in	81	74	74	67
4½ to 6 in	80	72	73	65
7 to 12 in	78	68	71	61
13 to 15 in	55	..	47	..

Butt Weld, extra strong, plain ends, card weight.

⅛, ¼, ⅜ in	70	60	65	55
½ in	75	69	70	64
¾ to 1½ in	79	73	74	68
2 to 3 in	80	74	75	69

Lap Weld, extra strong, plain ends, card weight.

1½ in	..	..	66	60
2 in	76	70	71	65
2½ to 4 in	78	72	73	67
4½ to 6 in	77	71	72	66
7 to 8 in	70	60	65	58
9 to 12 in	65	55	60	50

Butt Weld, double extra strong, plain ends, card weight.

½ in	65	59	60	54
¾ to 1½ in	68	62	63	57
2 to 3 in	70	64	65	59

Lap Weld, double extra strong, plain ends, card weight.

2 in	66	60	61	55
2½ to 4 in	68	62	63	57
4½ to 6 in	67	61	62	56
7 to 8 in	60	50	55	45

Plugged and Reamed.

1 to 1½, 2 to 3 in. Butt Weld
2, 2½ to 4 in. Lap Weld

Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.		*Charcoal Iron.*	
1¼ to 2¼ in	65	1½ in	48
2½ in	67½	1¾ to 2¾ in	50
2¾ to 3¼ in	72½	2½ in	55
3½ to 4 in	75	2¾ to 5 in	60
5 to 6 in	67½		
7 to 13 in	65		

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under, to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discounts, lowered by two points.

Pittsburgh

PITTSBURGH, PA., January 10, 1912. (*By Telephone.*)

Pig Iron.—A good deal of new inquiry is up and a considerable tonnage has been sold. The Pittsburgh Steel Company is reported to have bought 12,000 to 15,000 tons of basic from a local seller for January and February delivery, at about $12.25 at furnace, the iron to come from an Ohio River furnace interest with which the seller has close connection. Another local open-hearth steel company has bought 6000 tons of basic for first quarter delivery at about $12.40, Valley furnace, and has an option on 3000 tons more. The Westinghouse Machine Company, East Pittsburgh, has bought 2000 to 3000 tons of foundry grades for early shipment. The average price of Bessemer iron in December was $14.12, and basic iron, $12.25, Valley furnace. We note a sale of about 500 tons of No. 2 foundry iron for January delivery at $13, Valley furnace. A local concern has bought 10,000 to 12,000 tons of forge iron for first half delivery at $12.50, Valley furnace. The market on basic iron is firmer and Valley furnaces are all quoting $12.50 at furnace or higher. We quote: Bessemer, $14.25; malleable Bessemer, $12.75; basic, $12.50; No. 2 foundry, $13, and gray forge, $12.50, all at Valley furnace.

Steel Billets and Sheet Bars.—New specifications for billets and sheet and tin bars are enormously heavy. Shipments for January are therefore expected to show a large increase over last month. We quote: Bessemer and open hearth billets, 4 x 4 in., up to 0.25 carbon, $20; Bessemer and open hearth sheet bars, $21, and forging billets, $28, Pittsburgh or Youngstown.

(By Mail.)

Operations of works in this district, for the first quarter at least, will be on a much heavier scale than in the latter months of 1911. On January 6 the Carnegie Steel Company blew in its blast furnace at South Sharon and on January 9 No. 2 furnace at Mingo Junction and No. 3 furnace at Duquesne. Its Edgar Thomson J is going in blast and about January 12 No. 2 Clairton will be put in. It is now operating 46 of its 59 furnaces. It is not unlikely that early in February the company will start up its two furnaces and the Bessemer steel plant at Columbus, which have been shut down for more than four years. If this plant is started it will be primarily to supply sheet bars, as the company is much pressed for deliveries, being about five weeks behind. On January 8 the Jones & Laughlin Steel Company made the first heat in one of its Talbot open-hearth furnaces at Aliquippa. If present active conditions continue it is not unlikely that in February this company may blow in two or more of its blast furnaces at Aliquippa. The leading mills are now booked heavily for delivery in the first quarter and first half of this year, and the situation seems pretty well assured up to July 1 at least. Specifications are coming in at a fairly satisfactory rate and in semi-finished material are very heavy. The Carnegie Steel Company is out of the market as a seller of billets and sheet bars and has recently turned over business to its competitors on which it could not make deliveries. No material advances are looked for, but prices are strong all along the line. Heavy steel scrap is about 50c. a ton higher. There is still a decided scarcity in furnace coke for spot shipment and it has sold as high as $1.80 at oven.

Ferromanganese.—The market seems very firm on the basis of $41, Baltimore, for standard English 80 per cent., and a sale of 100 tons is reported for January and February shipment at that price. The freight rate for delivery in the Pittsburgh district is $1.95 per ton.

Ferrosilicon.—A local consumer is credited with having bought 300 tons of 50 per cent. at $70, Pittsburgh. We quote 10 per cent. at $21; 11 per cent., $22, and 12 per cent., $23, f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio. These latter prices, however, are sometimes materially shaded.

Muck Bar.—No new inquiry is reported. The market on high grade muck bar, made from all pig iron, is $28 to $28.50, Pittsburgh.

Wire Rods.—Consumers are covered by contracts against which specifications are coming in at a slightly better rate, but inquiry is quiet. Excellent records for output are being made on the rod mills of the Jones & Laughlin Steel Company. We quote Bessemer, open-hearth and chain rods at $24 to $24.50, Pittsburgh.

Steel Rails.—As yet no definite information has been received here on large contracts for rails reported to have been placed by leading roads. The demand for light rails is good, especially from the coal mining interests, and in the past week the Carnegie Steel Company received new orders and specifications for about 3000 tons. This company has sold 3000 tons of steel car wheels to the Louisville & Nashville and 500 tons to another Southern railroad. We quote splice bars at 1.50c. per lb., and repeat quotations on rails: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.25c.; 12 and 14-lb., 1.16c.; 16, 20 and 25-lb., 1.12c.; 30 and 35-lb., 1.10c., and 40 and 45-lb., 1.08c., f.o.b. at mill.

Structural Material.—A good deal of new work has been placed in the past week and inquiries are heavy. The Jones & Laughlin Steel Company has taken 3000 tons of steel for train sheds for the Michigan Central at Detroit and 7000 tons for its terminal station and 17-story office building. The McClintic-Marshall Construction Company has taken 2700 tons for New York Central terminal uses and the American Bridge Company 2000 tons for an office building. The report that the Jones & Laughlin Steel Company would roll 40,500 tons of steel for the Hell Gate bridge, recently secured by the McClintic-Marshall Construction Company, is premature. The steel contract has not yet been placed. It is stated that the American Bridge Company is filled up for at least six months, while local fabricators report they have more orders on their books at present than at any time for some months. Prices are firm, the minimum on beams and channels up to 15-in. being 1.15c. and on small lots, 1.20c., f.o.b. Pittsburgh.

Plates.—Orders for steel cars are more active. The Pennsylvania Lines West has given contracts to the Western Car & Foundry Company for 1000 box cars; Cambria Steel Company, 800 steel hoppers; Standard Steel Car Company, 200 steel hoppers and 400 gondolas, and American Car & Foundry Company, 600 steel gondolas. The Pennsylvania Railroad Lines East has ordered heavy steel gondola cars as follows: Standard Steel Car Company, 800; Cambria Steel Company, 1200; American Car & Foundry Company, 1000, and Pressed Steel Car Company, 1000. The Columbus, Hocking Valley & Toledo has bought 500 cars from the American Car & Foundry Company, to be built at Huntington, W. Va., and has an option on 500 more. The Missouri Pacific is in the market for a large number; Western Maryland for 2500, and Delaware, Lackawanna & Western for 500. The plate mills of the Carnegie company at Homestead are now running full time and are reported to be from four to five weeks behind in deliveries. Prices are firm and we quote ¼-in. and heavier plates at 1.15c. to 1.20c. at mill, Pittsburgh.

Sheets.—Present conditions in the sheet trade are more satisfactory than for some months. Leading mills report that specifications against contracts and actual orders sent to the mills for rolling in December were the heaviest in any one month since last March. A recent estimate made shows that mills are operating at present to about 80 per cent. of capacity. The market is firm.

Tin Plate.—It is stated that operations among the tin plate mills are now very close to 85 per cent. of capacity. Prices are firmer than for some time and $3.40 per base box for 14 x 20 coke plates, in small lots, is reported as being very well held.

Bars.—New orders and specifications for steel bars have shown a falling off, no doubt due to the holidays and inventory period. All the mills have heavy orders on their books for delivery in first quarter and first half, but there has been an enormous increase in capacity for making steel bars in the past year or two, and it takes a very heavy consumption to keep the mills busy. The demand for iron bars is better, and specifications against contracts are coming in more freely. We quote steel bars at 1.15c. to 1.20c., for delivery in first quarter ,and iron bars at 1.25c. to 1.30c. at mill for same delivery.

Hoops and Bands.—Prices are firm, with new demand and specifications better than for some time. We quote steel bands at 1.15c, with extras as per the steel bar card, and hoops at 1.25c. to 1.30c., for delivery in the first quarter, f.o.b. Pittsburgh.

Railroad Spikes.—Specifications have quieted down somewhat, but the makers are pretty well filled with orders through first quarter. We quote railroad spikes at $1.40 per 100 lb. in base sizes, f.o.b. Pittsburgh.

Rivets.—New orders are coming in better and specifications are being received more freely. We quote structural rivets at 1.45c. to 1.50c. and boiler rivets at 1.55c. to 1.60c., f.o.b. Pittsburgh.

Shafting.—The new demand is quiet, as most consumers are covered by contracts against which specifications are coming in at a fair rate. We quote cold-rolled shafting at 65 and 10 per cent. off in carload and larger

lots and 60 and 5 per cent. off in small lots delivered in base territory.

Spelter.—The market is strong. We quote prime grades at 6.30c., East St. Louis, equal to 6.42½c., Pittsburgh.

Wire Products.—Press reports that an advance of $1 a ton had been made in wire products effective January 8 are incorrect. The new demand for wire and wire nails is fair for the season. Prices are stated to be firmly held. We quote: Wire nails, $1.55; cut nails, $1.50; galvanized barb wire, $1.85; painted, $1.55; annealed fence wire, $1.35; galvanized fence wire, $1.65, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

Merchant Pipe.—Some heavy contracts for line pipe have been placed and others are pending. It is stated that the Central Kentucky Gas Company has placed an order with the Republic Iron & Steel Company for 70 miles of 10-in. Several months ago the Texas Company placed an order with Republic for 130 miles of 8-in., but specified for only 30 miles; it has now specified for the remaining 100 miles. Spang, Chalfant & Co., Inc., have taken contracts for 31 miles of 4 to 8-in. iron line pipe, part of which is for Western shipment, and the Philadelphia Company, of this city, supplier of natural gas, is in the market for 40 miles of 16-in. line pipe. The general demand for merchant pipe was heavier in December than in November, and new business so far this month is in excess of the same period last month. It is stated that regular discounts on both iron and steel pipe are being firmly held.

Tubes.—Some heavy orders for locomotive tubes continue to be placed, and the mills have more business on their books for delivery over the next two months or more than for some time. The new demand for merchant tubes is quiet and prices continue to be more or less shaded.

Iron and Steel Scrap.—The large purchases of heavy steel scrap by a local consumer running over the past three or four weeks have pretty well cleaned up the available supply, and with the new demand heavier than for some time prices have advanced from 50c. to 75c. a ton. Sales of special grades have been made as high as $13.50. We also note a very active demand for borings and turnings, which are scarce, and prices have advanced about 50c. a ton. In the past two or three weeks sheet and tin plate mills have been making heavy contracts for their bundled scrap with dealers, these contracts having been made at $10.60 to $11 at mill. Dealers quote as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery	$13.00 to $13.50
No. 1 foundry cast	11.75 to 12.00
No. 2 foundry cast	10.75 to 11.00
Bundled sheet scrap, f.o.b. consumers' mill, Pittsburgh district	10.75 to 11.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.50 to 12.75
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	9.00 to 9.25
Low phosphorus melting stock	15.25 to 15.50
Iron car axles	20.50 to 21.00
Steel car axles	16.00 to 16.25
Locomotive axles	22.00 to 22.50
No. 1 busheling scrap	11.00 to 11.25
No. 2 busheling scrap	7.00 to 7.25
Old car wheels	12.00 to 12.25
*Cast iron borings	9.50 to 9.75
*Machine shop turnings	10.00 to 10.25
†Sheet bar crop ends	13.75 to 14.00
Old iron rails	14.50 to 14.75
No. 1 wrought scrap	12.00 to 12.25
Heavy steel axle turnings	9.75 to 10.00
Stove plate	9.00 to 9.25

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Coke.—Consumers of blast furnace coke are pretty well covered by contracts and there is little or no new inquiry. There is a fair demand for foundry coke, with prices ruling firm. We note a continued shortage in the supply of blast furnace coke for prompt shipment, and sales are reported as high as $1.80 per net ton at oven. We quote standard makes of blast furnace coke for spot shipment at $1.75 to $1.80, while 72-hr. foundry coke is held at $1.90 to $2 for spot shipment and $2.10 to $2.25 for contract, per net ton at oven, to consumers for first half of the year. The output of coke in the Upper and Lower Connellsville regions last week showed a falling off as compared with the previous week of about 14,000 tons.

Chicago

CHICAGO, ILL., January 10, 1912—(*By Telegraph*).

Pig Iron.—Sales of local Northern pig iron continue in fair volume and at a much better rate than in January of last year, as evidenced by the sales of one interest which for the first week of this year equaled approximately the quantity sold in the entire month a year ago. Several contracts for important tonnages of Northern iron, including a portion of malleable, have been closed since the first of the year and inquiries are current in Chicago to cover the regular needs of a large maker of fittings for a limited tonnage of charcoal iron and a moderate tonnage for a Milwaukee consumer. This latter will undoubtedly be placed in Milwaukee because of lower prices available there as compared with the Chicago market, which continues on the basis of $14, f.o.b. furnace. The tonnage of ore on the docks of local furnaces is coming to be a factor in limiting sales of pig iron prior to the opening of navigation, and in this connection one interest has raised its price 50c. per ton. The Southern market is more quiet, with very few inquiries out. The basis of $10, Birmingham, continues to prevail, although some furnaces are adhering to prices 25c. and 50c. a ton higher. We continue to quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal	$16.00 to $16.50
Northern coke foundry, No. 1	14.50 to 15.00
Northern coke foundry, No. 2	14.00 to 14.50
Northern coke foundry, No. 3	13.50 to 14.00
Northern Scotch, No. 1	16.00
Southern coke, No. 1 foundry and No. 1 soft	14.85
Southern coke, No. 2 foundry and No. 2 soft	14.35 to 14.85
Southern coke, No. 3	14.10 to 14.35
Southern coke, No. 4	13.85 to 14.10
Southern gray forge	13.60 to 13.85
Southern mottled	13.60 to 13.85
Malleable Bessemer	14.35 to 14.50
Standard Bessemer	16.75
Basic	14.75
Jackson County and Kentucky silvery, 6 per cent.	16.40
Jackson County and Kentucky silvery, 8 per cent.	17.40
Jackson County and Kentucky silvery, 10 per cent.	18.40

(By Mail.)

From the standpoint of tonnage the holiday weeks and the first few days of the new year have not only been satisfactory but, in general, beyond expectation. In some instances the accumulated tonnage on the books of the mills is not as heavy as might be desired and at the same time, in order to reduce costs, production of material taken at recent low prices is being crowded to the maximum, with the result that orders are soon executed. In the matter of prices less progress has been made and the determining factor continues to be the status of the mill whose position is weakest. The most active material from a standpoint of tonnage is plates, with steel bars and structural shapes in good demand. The greatest lack in the market is orders for rails, although the requirements of the Hill roads seem near to closing. The advance in prices of old material has been checked and sales the past week were light.

Rails and Track Supplies.—Railroads are still delaying the placing of orders for rails, and the specifications that have been issued are generally less than anticipated. A surprisingly active demand for track fastenings is noted and orders for a round tonnage have been placed for delivery in February and March. During the past two weeks orders for locomotives and cars have included 30 engines for the Grand Trunk and 25 for the Burlington. The Burlington has also purchased 1500 gondolas from the American Car & Foundry Company and 1000 from the Pressed Steel Car Company. The Rock Island ordered from the Pullman Company 300 box cars and from the Rodgers Ballast Car Company 200 ballast cars. The Chicago, Elgin & Joliet bought 500 cars from the Pullman Company and 250 from the Standard Steel Car Company. The Haskell-Barker Company will build 1500 refrigerator cars for the Great Northern. Pending inquiries for rolling stock remain plentiful. We quote standard railroad spikes at 1.50c., base; track bolts, with square nuts, 1.90c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c., Chicago.

Structural Material.—The most important contracts for fabricated steel placed during the week were for smelters, one for the Calumet & Arizona Mining Company, requiring 5600 tons, and one for the Arizona Copper Company, 3500 tons, both of which were taken by the Kansas City Structural Company. The American

Bridge Company will furnish 1250 tons of bridge material for the Burlington Railroad and the Noelke-Richards Company was awarded 512 tons for a bank at Burlington, Iowa. A number of small contracts aggregating 1087 tons for buildings on the Pacific coast were also placed. The Wisconsin Bridge & Iron Company will fabricate 1400 tons for a bridge of the Grand Trunk Railroad at Bay City, Mich., and inquiries are in the market for 3100 tons for the Canadian Pacific and 2000 tons for the Chicago Great Western. Local mills are taking the more attractive business at 1.30c. to 1.33c., but some of the Eastern mills which are in a position to ship promptly are adhering to the basis of 1.20c., Pittsburgh, and are taking some tonnage. We quote for Chicago delivery, mill shipment, 1.30c. to 1.38c., and from store 1.60c.

Plates.—The tonnage of plates being booked by the mills in this territory is maintained in heavy volume. Specifications from car builders are responsible for the major portion of this business, but it is also apparent from the orders that builders of boilers and tanks are also active buyers. Deliveries are seldom better than three or four weeks. We quote for mill shipment, Chicago delivery, 1.30c. to 1.35c., and from store, 1.60c.

Sheets.—Users of sheets continue to buy in good volume and the largest independent maker in this territory is operating all of its mills. While higher prices are being asked, the market continues to develop weaknesses in some quarters under the pressure of desirable business, so that, with the exception of an advance of about $1 a ton from extreme concessions, low prices still prevail. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.35c.

Bars.—The local steel bar market remains in *statu quo* with specifications prompt and liberal and prices showing a range of $1 to $1.50 a ton between desirable business and small orders. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.25c. to 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars rolled from old rails, 1.15c. to 1.20c. From store: Soft steel bars, 1.50c. to 1.55c., Chicago.

Old Material.—The rapid advance in prices of scrap has been checked, as forecasted in the report of a week ago, by the refusal of consumers to take on additional tonnage at prevailing quotations. During the last week of the year consumers paid as high as $12 per net ton for No. 1 railroad wrought, while at the present time $11.75 is not considered an attractive offer. Buying during the week was very light, and, while no apparent weaknesses have as yet developed, a continuance of the conservative attitude on the part of melters, engendered by the low prices of finished material, seems certain to result in more aggressive selling by the dealers. During the week the Chicago & Northwestern sold 7000 tons of scrap and realized the top market prices. The Chicago, Milwaukee & St. Paul is offering 1500 tons, the Michigan Central 3000 tons and the Soo Line 250 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, per gross ton, as follows:

Old iron rails	$15.00 to $15.50
Old steel rails, rerolling	12.75 to 13.25
Old steel rails, less than 3 ft.	11.75 to 12.25
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	13.25 to 13.75
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.25 to 10.75
Steel axle turnings	8.50 to 9.00

The following quotations are per net ton:

Iron angles and splice bars	$12.75 to $13.25
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.00 to 10.50
Iron car axles	18.00 to 18.50
Steel car axles	15.50 to 16.00
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Steel knuckles and couplers	10.00 to 10.50
Steel springs	10.50 to 11.00
Locomotive tires, smooth	13.25 to 13.75
Machine shop turnings	6.75 to 7.25
Cast and mixed borings	6.00 to 6.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.25 to 6.75
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	11.00 to 11.50
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	10.75 to 11.25
Agricultural malleable	9.00 to 9.50
Pipes and flues	8.00 to 8.50

Wire Products.—Makers are encouraging the belief that another advance in prices is imminent. The movement of material, particularly wire nails and plain wire, has been only moderate, but the entire tonnage of wire in its various forms sold during December showed gains over previous records for that month. We quote: Plain wire, No. 9 and coarser, base, $1.53; wire nails, $1.73; painted barb wire, $1.73 to $1.78; galvanized, $2.03 to $2.08; polished staples, $1.78 to $1.83; galvanized, $2.08 to $2.13, all Chicago.

Philadelphia

PHILADELPHIA, PA., January 9, 1912.

While the market has exhibited a seasonable dullness in certain lines a good movement is noted in some directions. This has particularly been the case in pig iron. Efforts to uplift prices of plates and shapes are more pronounced, but the market has not been seriously tested. Reports of higher prices for both rolling and forging billets are heard, but recent quotations are still available. A fair volume of business in furnace coke is moving, with prices stiffening. Old material is quiet, with quotations firm.

Pig Iron.—A rather satisfactory movement in foundry grades is noted, although orders have usually been small. The larger consumers appear to be pretty well covered as to near future requirements, and while there is a good volume of inquiry for the higher grades of foundry iron the major portion has been for moderate lots. A number of Eastern furnaces are now pretty well sold up and are not seeking business aggressively at the inside current quotations, which, however, are still available in several instances for deliveries extending over the first quarter and half of the year. Several producers stand flatly on $15.25, delivered, for eastern Pennsylvania No. 2 X foundry, but take little business at that basis. Virginia foundry iron has been comparatively active since the first of the year. Several 500-ton sales for first quarter shipment have been made. A good share of the business has been placed at $12.25, furnace, although several makers have experienced no difficulty in obtaining $12.50 and have booked considerable business at that figure. While the cast iron pipe makers have not had any large definite inquiries before the trade they have been purchasing odd bargain lots when offered, one sale of several thousand tons of off basic iron being reported at $14.25, delivered. Very little business in rolling mill forge iron is noted. Slightly more movement in steel making iron is reported. A local consumer, who inquired for 4000 tons of Bessemer, 2000 tons of basic and 3000 tons of low phosphorus, has closed for 8000 tons of Bessemer at close to $16, delivered, and 3000 tons of low phosphorus, which is reported sold at a trifle under the market, against a previous quotation, but has not yet closed for the basic iron inquired for. Another Eastern consumer is feeling around for several thousand tons of basic for early delivery, while a consumer in the central part of the State has taken on small lots of basic for immediate needs, reported to have been Southern, at $14.20, delivered. The same buyer is reported as ready to buy a fair block of basic at $14, but sellers refuse to meet the price. Several moderate lots of standard low phosphorus have been sold at $19.25 to $19.50, delivered here. While the position of producers in this district is statistically good, as shown by reports received at the meeting of the Eastern Pig Iron Association last week, there has been no material strengthening of prices. Unfilled orders have increased materially, while stocks of foundry iron are smaller, even though the aggregate stocks are slightly larger than on December 1, due to the accumulation of basic iron, on which shipments have been deferred, and slight gains in stocks on yards of steel makers producing their own iron. Carbon furnace has blown in and Sheridan is preparing to go in. Princess, in Virginia, will be blown in about February 1. Quotations are firm, the following range being named for delivery, in buyers' yards, during the first quarter and half:

Eastern Pennsylvania No. 2 X foundry	$14.85 to $15.25
Eastern Pennsylvania No. 2 plain	14.60 to 15.00
Virginia foundry	15.00 to 15.50
Gray forge	14.25
Basic	14.25 to 14.50
Standard low phosphorus	19.25 to 19.50

Iron Ore.—Foreign offerings are light, particularly Swedish and Spanish ores, sellers of which are handicapped by the scarcity of vessels and high ocean freights. A small amount of Swedish ore for early shipment is said to be available, but sellers refuse to consider forward business. A large quantity of Spanish ore has been diverted from this country to European consumers. Newfoundland ore has not yet been generally offered. A large quantity of Cuban ore is available for consumers in this district. Further sales of

domestic ores continue to be made, one transaction involving 10,000 to 15,000 tons of New Jersey ore having been closed. Importations during the week included 6125 tons of Swedish and 13,925 tons of Cuban ore. Total importations at the port of Philadelphia in 1911 aggregated 984,194 tons.

Ferroalloys.—Small sales of 50 per cent. ferromanganese have been made at $41, Baltimore, although no important inquiry has developed from consumers in this district. Fifty per cent. ferrosilicon is quiet, but small sales of 10 to 12 per cent. have been made at recent quotations, $24.30 to $26.30, delivered.

Billets.—A better volume of business is moving, particularly in forging billets, for which consumers are coming into the market more freely for lots of several hundred tons for early delivery, which are still taken by producers in this district at $26.40 to $27.40, according to specification. Moderate sales of basic open-hearth rolling billets for early shipment are reported at $22.40, delivered in this vicinity, notwithstanding rumors of higher prices. Eastern makers report specifications as coming out more freely, but no improvement in mill operations is noted.

Plates.—While quotations are becoming more general at 1.35c., delivered, as a minimum, and a fair amount of miscellaneous business is moving at that basis, that figure has not been seriously tested by any inquiries of importance. In several instances the 1.30c. minimum is still being quoted. Business has been light and mills have not made any material gains in the productive rate.

Structural Material.—A slightly better volume of miscellaneous business is reported, and in a number of instances 1.35c., delivered, is obtained for orders of that character. No large building propositions have come up for estimate and the several under negotiation are still unclosed. Specifications for the new Manufacturers' Club will be ready for estimate next week. While a larger proportion of makers are quoting a minimum of 1.35c., delivered, for plain shapes, 1.30c. is in instances still available.

Sheets.—A very satisfactory run of business is reported. Eastern mills are running close to full capacity and have sufficient business on hand to keep them so engaged for some time. Prices are firm at 2.05c., delivered here, for Western No. 28 sheets, on which Eastern mills, making smooth, loose rolled sheets, easily obtain ¼c. to ½c. per lb. advance.

Bars.—The market is rather quiet. Makers are endeavoring to maintain a minimum of 1.20c., mill, for iron bars, and sales have been made at that basis, which is equivalent to 1.27½c., delivered. Reports are heard, however, that on desirable business 1.25c. can still be done. Steel bars are firm at 1.30c., minimum, for prompt delivery in this district, with a fair amount of business moving.

Old Material.—While there has been little heavy buying, small sales have been more pronounced, and in a number of instances at slightly better prices. There has been little demand for No. 1 heavy melting steel, although this grade on some of the railroad lists brought better than $12.50, delivered. Considerable material of this grade is being diverted West, where higher prices than prevail in this district are being paid. Sales of several thousand tons of wrought pipe are reported at $12.50, delivered. Borings and turnings are less plentiful and command better prices. Small lots of machinery cast are moving at slightly higher prices. Rolling mills are showing a little more interest in the market, but making few large purchases. The following range of prices about represents quotations at which the ordinary current business for prompt shipment can be done for delivery in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate from Philadelphia varying from 35c. to $1.35 per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap	$12.25 to $12.75
Old steel rails, rerolling (nominal)	14.00 to 14.50
Low phosphorus heavy melting steel scrap	15.50 to 16.00
Old steel axles	18.00 to 18.50
Old iron axles	22.50 to 23.50
Old iron rails	16.50 to 17.50
Old car wheels	12.50 to 13.00
No. 1 railroad wrought	15.50 to 16.00
Wrought iron pipe	12.00 to 12.50
No. 1 forge fire	10.50 to 11.00
No. 2 light iron (nominal)	6.75 to 7.25
Wrought turnings	9.50 to 10.00
Cast borings	8.50 to 9.00
Machinery cast	13.75 to 14.25
Railroad malleable (nominal)	11.75 to 12.25
Grate bars, railroad (nominal)	10.00 to 10.50
Stove plate	10.25 to 10.75

Coke.—A moderate movement is noted in both prompt and forward foundry coke at $2 to $2.25 at oven, but no large quantities were involved. One contract for 100,000 tons of furnace coke for this year's delivery has been closed, and negotiations for several round lots are still pending. Prompt furnace coke is quoted at $1.80, while $1.75 to $1.80 is now named for deliveries extending over the first half. The following range of prices, per net ton, delivered in this district, is named:

Connellsville furnace coke	$3.90 to $4.00
Foundry coke	4.15 to 4.50
Mountain furnace coke	3.65 to 3.75
Foundry coke	3.95 to 4.40

The partnership of Matlack & Bates, iron and coke merchants, Philadelphia, was dissolved December 30. A new partnership under the name of Marshall, Matlack & Co. has been formed, composed of F. Warren Marshall and Howard C. Matlack, who will continue the business, with offices at 1119 Pennsylvania Building.

Cleveland

CLEVELAND, OHIO, January 9, 1912.

Iron Ore.—Shipments from Lake Erie docks to furnace yards in December were much heavier than in the corresponding month a year ago, aggregating 703,503 tons. This is about one-third of the total shipments during the closed season from December 1, 1910, to May 1, 1911. They have fallen off materially during the week because of cold weather, but they are expected to pick up again as soon as ore is thawed out. There are yet no developments in regard to prices for the coming season. We quote as follows: Old range Bessemer, $4.50; Mesaba Bessemer, $4.25; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Pig Iron.—The market is not as active as before the holidays, but a moderate volume of business in small orders for foundry grades for first quarter delivery is still coming out. The American Rolling Mill Company, Middletown, Ohio, is in the market for 5000 tons of basic for first quarter. We note the sale of one 4000-ton lot of Northern foundry iron. An Ohio engine builder has bought 1000 tons of Northern iron for first half. The Massillon Iron & Steel Company, Massillon, Ohio, has an inquiry out for 10,000 tons of iron for delivery from February 1 at the rate of 2500 tons a month. The inquiry specifies 4000 tons of No. 3, 3000 tons of No. 4 and 3000 tons of gray forge. It is stated that this purchase is contingent on a reorganization of the company. A leading sanitary interest is in the market for 1000 tons of No. 2 Southern and 1000 tons of Southern gray forge for its Louisville plant. While the market is generally firm on foundry grades sellers that have advanced prices 25c. a ton appear unable as yet to take on contracts at the advance. One local producer is asking $13.50, delivered, for No. 2 foundry, but is getting no business at that price. Another local producer is still quoting No. 2 foundry at $12.75 for outside shipment. Southern iron is firm, and some small sales are being made at $10.50, Birmingham, for No. 2. We quote as follows for prompt shipment and for the first half, delivered, Cleveland:

Bessemer	$15.15
Basic	13.25
Northern foundry No. 2	$13.25 to 13.50
Southern foundry No. 2	14.35 to 14.85
Gray forge	12.50
Jackson County silvery, 8 per cent. silicon	17.05

Coke.—There is an improved demand for foundry grades, several contracts for the first half having been closed during the week. The scarcity of labor in the coke regions that has caused furnace coke to advance has now affected foundry coke and some producers are holding for higher prices. Standard Connellsville furnace coke is held at $1.80 to $1.85 for prompt shipment. We quote standard Connellsville foundry coke at $2 to $2.15, per net ton, at oven, for prompt shipment and $2.15 to $2.40 for contract.

Finished Iron and Steel.—Business in finished lines has not yet recovered the activity that existed before the holidays. Manufacturers have not yet finished their inventories. New business has therefore been confined almost entirely to small lots of material. Mills are getting a fair volume of specifications on contracts. No inquiries for round lots are pending. Bids are being received for 6000 tons of structural material for the Dime Savings Bank building in Detroit. The structural situation is quiet in this city, no new work of any size being in prospect. The general price situation shows no change. Steel bars are firm at 1.15c., Pitts-

burgh, for prompt shipment and first quarter. Plates are generally quoted at 1.20c., Pittsburgh, but some of the mills are still shading this price $1 a ton. Structural material is fairly firm at 1.20c., Pittsburgh, but an inquiry for a round tonnage would probably bring out 1.15c. The contract for a new power building of concrete construction to be erected in Toledo, Ohio, has been let to A. Bentley & Sons, of that city. It will require 800 tons of reinforcing bars. Sheet mills are getting a good volume of specifications on contracts, but not much new business is coming out, consumers being well covered by contracts. The recent advance in prices seems to be well maintained, although no large inquiries are appearing to test the market. The demand for iron bars is rather light, local mills getting enough orders to keep them running about one-half of the time. We quote iron bars at 1.20c., Cleveland mill.

Old Material.—The demand has been very light. Dealers, however, look for improvement as soon as mills finish taking their inventories. Local mills are well supplied with scrap and are not in the market, but will buy what can be picked up at attractive prices. The market is generally quite firm. Dealers are holding for better prices. Heavy steel scrap has advanced about 25c. per ton and little, if any, of this grade can be bought at less than $12. The scrap sold by the Pennsylvania Lines West and the Wheeling & Lake Erie Railroad brought very good prices. Dealers' prices, per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails, rerolling	$12.25 to $12.75
Old iron rails	14.00 to 14.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.75 to 12.25
Old car wheels	12.25 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.50 to 11.00
Railroad malleable	11.75 to 12.00
Light bundled sheet scrap	9.50 to 10.00

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$18.50 to $19.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	6.75 to 7.00
Steel axle turnings	7.25 to 7.75
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.00 to 11.25
No. 1 cast	11.25 to 11.75
Stove plate	9.00 to 9.25
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, January 10, 1912—(*By Telegraph*).

Pig Iron.—Considering the extremely cold weather that has recently prevailed in the Central West, iron merchants were somewhat surprised over the fairly satisfactory tonnage booked. Prices are firm and unchanged in both the Southern and Northern districts. Two 300-ton lots of Southern No. 2 foundry were contracted for by nearby consumers at $10, Birmingham, for first quarter movement. Approximately 800 tons of the same grade of iron was booked by a northern Ohio melter at $10 for that shipped during the first quarter and at $10.25 for the second quarter. Another recorded sale is one for 1000 tons of Southern No. 3 foundry at $9.50 for second quarter shipment. Northern foundry iron is moving slowly, and $13 for No. 2 is the recognized quotation for any shipment during the next six months. Malleable is a little more active, and 750 tons went to a northern Ohio melter at $13, Ironton, shipments to be completed before July 1. Among inquiries is one for 500 tons of Northern No. 2 foundry and 300 tons of Southern, for a central Ohio melter, for second quarter delivery. A southern Ohio rolling mill is asking for 5000 tons of basic, and there is a northern Ohio inquiry for 10,000 tons of mixed grades, all for first half and movement about equally divided between Nos. 3 and 4 foundry and gray forge. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote f.o.b. Cincinnati as follows for prompt shipment:

Southern coke, No. 1 foundry and 1 soft	$13.75 to $14.25
Southern coke, No. 2 foundry and 2 soft	13.25 to 13.75
Southern coke, No. 3 foundry	12.75 to 13.25
Southern coke, No. 4 foundry	12.50 to 13.00
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon	16.45 to 16.95
Lake Superior coke, No. 1	14.70 to 14.95
Lake Superior coke, No. 2	14.20 to 14.45
Lake Superior coke, No. 3	13.70 to 13.95
Basic, Northern	14.20 to 14.45
Standard Southern Car Wheel	25.25 to 25.50
Lake Superior car wheel	19.00

(By Mail.)

Coke.—Prices in all three districts are firm, but the demand for both furnace and foundry grades is limited. The exception has been in the Connellsville field, where spot shipment blast furnace coke is bringing from $1.75 to $1.80 per net ton at oven, which figures about represent those inserted in first half contracts. Connellsville furnace grades, for immediate shipment, have been sold during the latter part of December a few cents higher than these quotations, but a lessening in the demand has brought out more settled prices. Foundry coke is probably a little stronger, and for prompt movement is quoted in the Connellsville, Wise County and Pocahontas fields around $2 to $2.10 per net ton at oven, but it is probable that a number of first grade brands can be obtained as low as $1.90. Contract quotations range all the way from $2 to $2.40, although $2.15 about represents the average obtained for any shipment before July 1.

Finished Material.—Bad weather conditions caused a letup in the buying of structural material, but both the mill agencies and warehouses report a fair business for the season in other lines. Hoops and bands are moving fairly well, and railroad track material gives signs of reviving soon. The mill price on steel bars remains at 1.15c., Pittsburgh basis, with some producers asking 1.20c. The local warehouse quotation is unchanged at 1.60c. for steel bars and at 1.70c. for structural material cut to lengths. Some business is also reported in tin plate, on which the base price is 3.40c., Pittsburgh.

Old Material.—There is not much demand, but dealers are a trifle more optimistic, and are predicting that prices may seek a slightly higher level before the end of the first quarter. The minimum figures given below represent what buyers are willing to pay for delivery at their yards in southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

Per Net Ton.

No. 1 railroad wrought	$9.75 to $10.50
Cast borings	4.50 to 5.00
Steel turnings	5.50 to 6.00
No. 1 cast scrap	9.50 to 10.25
Burnt scrap	6.50 to 7.00
Old iron axles	15.75 to 16.50
Locomotive tires (smooth inside)	11.25 to 12.00
Pipe and flues	7.00 to 7.50
Malleable scrap	7.25 to 8.00

Per Gross Ton.

Bundled sheet scrap	7.00 to 7.75
Old iron rails	13.00 to 13.75
Relaying rails, 50 lb. and up	20.75 to 21.50
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.50 to 10.25
Old car wheels	11.00 to 11.50
Heavy melting steel scrap	9.50 to 10.25

Birmingham

BIRMINGHAM, ALA., January 8, 1912.

Pig Iron.—An aggregate of 4500 tons of Nos. 2 and 3 foundry is reported sold the past week on a basis of $10.50, Birmingham, for No. 2. It consisted of one lot of 1500 tons, two lots of 750 tons each, and lots of 300 to 500 tons each, all for shipment in the first half. A lot of 1500 tons of No. 2 soft for shipment this month was sold at $10, and an aggregate of 1100 tons of the same grade for first quarter was sold at the same price. The sale of warrants to cover 500 tons of high manganese iron is reported at $11 at furnace. From 750 to 1000 tons of regular fracture iron, under warrant, was offered on the basis of $10 for No. 2 foundry with a differential of 50c. per ton for No. 3, f.o.b. cars at furnace, which represents a concession of 25c. per ton from a $10 schedule when offered in certain quarters of the territory, owing to freight rate advantages. The inquiry, as a whole, was of a desultory nature, and at this time only comparatively small lots are pending. So far as can be ascertained, the resumption of foundry operations after the close-down for the holidays was general, and the movement from all furnace yards has increased. In one instance the entire stock has been moved and the daily output is being loaded into cars, while at a plant that has been idle for some months the yard has been cleaned of all grades. Within the week, one furnace was blown out for relining, and still another is scheduled to go out before the end of this month. In neither of the cases referred to has there been any announcement as to the blowing in of furnaces to take the place of those blown out. A change in operations at the North Birmingham plant will soon be made without increasing the output, and repairs to one of the City furnaces have just been completed. It is understood that the Hattie Ensley plant of the Sloss-Sheffield Company at Sheffield, Ala., will be repaired immediately in order to take the place of a stack that will have to be relined in the next few months. Furnace stock returns for January 1 are not in hand at this time, but conditions existing since the first of the year have not changed the views of selling interests to any

appreciable extent. All parties concerned are apparently content to await further developments, in which connection the result of efforts by local interests to secure lower freight rates from this district to Ohio and Mississippi River crossing points is being awaited with much interest. The market is quoted as below, f.o.b. Birmingham, for the entire first half, but, as is indicated above, higher asking prices are being maintained by certain producing interests:

No. 1 foundry and No. 1 soft	$10.50
No. 2 foundry and No. 2 soft	10.00
No. 3 foundry	9.50
No. 4 foundry	9.25
Gray forge	9.00
Standard basic	10.00
Off basic	9.50

Cast Iron Pipe.—An attractive tonnage, comparatively, in small lots, was placed, but the result of bids on larger contracts is not yet known. Contracts have just been placed for certain improvements to the plant of the United States Cast Iron Pipe & Foundry Company at North Birmingham, Ala., and it is understood that operations will probably be commenced June 1. Nothing definite is known of the plans to operate the plant at Sheffield, Ala. We continue to quote this market as follows, for water pipe, per net ton, f.o.b. cars: 4 to 6 in., $23; 8 to 12 in., $22; over 12 in., average $21, with $1 per ton extra for gas pipe. These prices are probably shaded for large municipal contracts.

Old Material.—A continued demand exists for wrought and steel grades, but with no transactions of unusual importance. The movement for the week was very satisfactory, especially to the smaller mills. We continue to quote the market as follows, per gross ton, f.o.b. cars:

Old iron axles (light)	$12.00 to $12.50
Old steel axles (light)	11.00 to 11.50
Old iron rails	11.00 to 11.50
No. 1 railroad wrought	10.00 to 10.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	6.00 to 6.50
No. 2 country wrought	5.50 to 6.00
No. 1 machinery	8.50 to 9.00
No. 1 steel	8.00 to 8.50
Tram car wheels	7.50 to 8.00
Standard car wheels	9.50 to 10.00
Light cast and stove plate	6.00 to 6.50

Finished Material.—From a local standpoint, the market is in a very satisfactory condition, with the volume of business increasing. It is understood on good authority that the Ensley mill will be kept in steady operation for some months to fill orders in hand, while the Bessemer mill continues to work a double shift. The Alabama City plant is well supplied with orders for the wire fencing and nail departments, and the output from the rolling mill at that plant is being moved.

The charcoal iron furnace of the Eagle Iron Company at Attalla, Ala., has been blown out for relining.

The Alabama Consolidated Coal & Iron Company, has blown out its No. 2 Ironton furnace for relining. No. 1 furnace at that plant is also idle.

Boston

BOSTON, MASS., January 9, 1912.

Old Material.—The demand is fully as strong as it has been, turnings and borings moving more actively than the remainder of the list. Prices show no change. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$9.50 to $10.00
Low phosphorus steel	11.45 to 11.95
Old steel axles	14.00 to 14.50
Old iron axles	17.00 to 18.00
Mixed shafting	12.75 to 13.25
No. 1 wrought and soft steel	11.00 to 11.25
Wrought iron pipe	9.25 to 9.50
Skeleton (bundled)	7.00 to 7.50
Cotton ties	7.00 to 7.50
No. 2 light	4.50 to 5.00
Wrought turnings	5.00 to 5.50
Cast borings	4.50 to 5.00
Machinery, cast	12.50 to 13.00
Malleable	9.25 to 9.75
Grate bars	6.00 to 6.50
Stove plate	8.00 to 8.50

The German Iron Market

BERLIN, December 28, 1911.

The activity of the iron trade has apparently been but little affected by the holiday season. The firmness of prices continues. It now transpires that the Pig Iron Syndicate several days ago raised the price of Luxemburg hematite and iron, owing to the recent advance of prices in England. It is reported that the syndicate will about the middle of January declare business open for the second half-year. A slight advance on Luxemburg iron is looked for and other advances will be made if the Coal Syndicate should raise the price of coke, which seems not improbable. The export market for steel bars has received a fresh impulse within a week, and prices have risen several marks. It is reported that export houses in Berlin and Hamburg have bought large lots of Belgian bars for the foreign trade. The cause for buying there was, presumably, that German mills were too busy to fill orders on time, they being now sold out for the first half of the year.

The report of the Steel Works Union on shipments of class B products in November shows a new record for plates, while bars, rods, tubes, castings and forgings were shipped at about the same rate as in October, hence the figures are slightly lower for the shorter month. Shipments of plates reached 104,469 tons, against 101,828 tons in October.

The shipments of the Siegerland ore association in November were heavier than for October, and it is reported that the demand for ores has grown more active this month. That district will soon begin shipping ores to the Silesian iron district, which will be a new thing in the history of the trade there.

There is nothing new to report regarding the negotiations for the renewal of the Steel Works Union, though newspaper discussions of the matter are growing visibly more pessimistic. The big claims for increased allotments are a sufficient explanation for this. The idea of leaving class B goods entirely outside of the syndicate arrangement is being further discussed with favor. Moreover, as nearly all the big companies have now become consumers of their own steel, having built or annexed mills for turning out the more finished products, it is pointed out that these great establishments have less interest than hitherto in the Union itself. They are in a position, it is argued, to dispense with its assistance. Talk of this kind is evidently designed to prepare the way for giving a quietus to the combination.

The rising tendency is indicated by the fact that the Union has just reduced by 5 marks a ton the drawback paid by it on exports of black sheets; and by the additional fact that the Coal Syndicate has abolished its drawback of 1.50 marks a ton on coal consumed in manufacturing finished steel for export. This action in both cases means that higher prices on export orders must be demanded by makers. These changes were made owing to the recent advances of prices in foreign markets, which, it is explained, render artificial assistance to the export trade no longer necessary in the same degree as hitherto. The drawback on sheets remains at 15 marks a ton after this reduction.

St. Louis

ST. LOUIS, MO., January 8, 1912.

The market here shows a little slackening in demand and during the past week the contracts made have not been large nor numerous. There has, however, been no softening of prices. The general feeling is that as soon as the year's business really sets in there will be considerable activity—much more, in fact, than prevailed at the same period a year ago.

Pig Iron.—The forward movement of pig iron under contract continues up to the written requirements and in some cases in excess, indicating that the consumption is continuing good. The largest sale of the week was 800 tons of Southern for first half delivery. Other sales have been carloads. Practically nothing is doing in Northern iron. There is some feeling that there will be few heavy buyers in the market until second quarter requirements begin to be felt.

Coke.—A considerable tonnage is going forward, but no important new contracts are being made. The largest sale of the week was 300 tons for first half delivery, while carload orders were not particularly numerous. By-product coke is higher, $5.20 being the best quotation to-day.

Finished Iron and Steel.—The demand is quiet, but the shipments going forward are up to the mark. In

burgh, for prompt shipment and first quarter. Plates are generally quoted at 1.20c., Pittsburgh, but some of the mills are still shading this price $1 a ton. Structural material is fairly firm at 1.20c., Pittsburgh, but an inquiry for a round tonnage would probably bring out 1.15c. The contract for a new power building of concrete construction to be erected in Toledo, Ohio, has been let to A. Bentley & Sons, of that city. It will require 800 tons of reinforcing bars. Sheet mills are getting a good volume of specifications on contracts, but not much new business is coming out, consumers being well covered by contracts. The recent advance in prices seems to be well maintained, although no large inquiries are appearing to test the market. The demand for iron bars is rather light, local mills getting enough orders to keep them running about one-half of the time. We quote iron bars at 1.20c., Cleveland mill.

Old Material.—The demand has been very light. Dealers, however, look for improvement as soon as mills finish taking their inventories. Local mills are well supplied with scrap and are not in the market, but will buy what can be picked up at attracive prices. The market is generally quite firm. Dealers are holding for better prices. Heavy steel scrap has advanced about 25c. per ton and little, if any, of this grade can be bought at less than $12. The scrap sold by the Pennsylvania Lines West and the Wheeling & Lake Erie Railroad brought very good prices. Dealers' prices, per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails, rerolling	$12.25 to $12.75
Old iron rails	14.00 to 14.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.75 to 12.25
Old car wheels	12.25 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.50 to 11.00
Railroad malleable	11.75 to 12.00
Light bundled sheet scrap	9.50 to 10.00

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$18.50 to $19.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	6.75 to 7.00
Steel axle turnings	7.25 to 7.75
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.00 to 11.25
No. 1 cast	11.25 to 11.75
Stove plate	9.00 to 9.25
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, January 10, 1912—(*By Telegraph*).

Pig Iron.—Considering the extremely cold weather that has recently prevailed in the Central West, iron merchants were somewhat surprised over the fairly satisfactory tonnage booked. Prices are firm and unchanged in both the Southern and Northern districts. Two 300-ton lots of Southern No. 2 foundry were contracted for by nearby consumers at $10, Birmingham, for first quarter movement. Approximately 800 tons of the same grade of iron was booked by a northern Ohio melter at $10 for that shipped during the first quarter and at $10.25 for the second quarter. Another recorded sale is one for 1000 tons of Southern No. 3 foundry at $9.50 for second quarter shipment. Northern foundry iron is moving slowly, and $13 for No. 2 is the recognized quotation for any shipment during the next six months. Malleable is a little more active, and 750 tons went to a northern Ohio melter at $13, Ironton, shipments to be completed before July 1. Among inquiries is one for 500 tons of Northern No. 2 foundry and 300 tons of Southern, for a central Ohio melter, for second quarter delivery. A southern Ohio rolling mill is asking for 5000 tons of basic, and there is a northern Ohio inquiry for 10,000 tons of mixed grades, all for first half and movement about equally divided between Nos. 3 and 4 foundry and gray forge. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote f.o.b. Cincinnati as follows for prompt shipment:

Southern coke, No. 1 foundry and 1 soft	$13.75 to $14.25
Southern coke, No. 2 foundry and 2 soft	13.25 to 13.75
Southern coke, No. 3 foundry	12.75 to 13.25
Southern coke, No. 4 foundry	12.50 to 13.00
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon	16.45 to 16.95
Lake Superior coke, No. 1	14.70 to 14.95
Lake Superior coke, No. 2	14.20 to 14.45
Lake Superior coke, No. 3	13.70 to 13.95
Basic, Northern	14.20 to 14.45
Standard Southern Car Wheel	25.25 to 25.50
Lake Superior car wheel	19.00

(By Mail.)

Coke.—Prices in all three districts are firm, but the demand for both furnace and foundry grades is limited. The exception has been in the Connellsville field, where spot shipment blast furnace coke is bringing from $1.75 to $1.80 per net ton at oven, which figures about represent those inserted in first half contracts. Connellsville furnace grades, for immediate shipment, have been sold during the latter part of December a few cents higher than these quotations, but a lessening in the demand has brought out more settled prices. Foundry coke is probably a little stronger, and for prompt movement is quoted in the Connellsville, Wise County and Pocahontas fields around $2 to $2.10 per net ton at oven, but it is probable that a number of first grade brands can be obtained as low as $1.90. Contract quotations range all the way from $2 to $2.40, although $2.15 about represents the average obtained for any shipment before July 1.

Finished Material.—Bad weather conditions caused a letup in the buying of structural material, but both the mill agencies and warehouses report a fair business for the season in other lines. Hoops and bands are moving fairly well, and railroad track material gives signs of reviving soon. The mill price on steel bars remains at 1.15c., Pittsburgh basis, with some producers asking 1.20c. The local warehouse quotation is unchanged at 1.60c. for steel bars and at 1.70c. for structural material cut to lengths. Some business is also reported in tin plate, on which the base price is 3.40c., Pittsburgh.

Old Material.—There is not much demand, but dealers are a trifle more optimistic, and are predicting that prices may seek a slightly higher level before the end of the first quarter. The minimum figures given below represent what buyers are willing to pay for delivery at their yards in southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

Per Net Ton.

No. 1 railroad wrought	$9.75 to $10.50
Cast borings	4.50 to 5.00
Steel turnings	5.50 to 6.00
No. 1 cast scrap	9.50 to 10.25
Burnt scrap	6.50 to 7.00
Old iron axles	15.75 to 16.50
Locomotive tires (smooth inside)	11.25 to 12.00
Pipe and flues	7.00 to 7.50
Malleable scrap	7.25 to 8.00

Per Gross Ton.

Bundled sheet scrap	7.00 to 7.75
Old iron rails	13.00 to 13.75
Relaying rails, 50 lb. and up	20.75 to 21.50
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.50 to 10.25
Old car wheels	11.00 to 11.50
Heavy melting steel scrap	9.50 to 10.25

Birmingham

BIRMINGHAM, ALA., January 8, 1912.

Pig Iron.—An aggregate of 4500 tons of Nos. 2 and 3 foundry is reported sold the past week on a basis of $10.50, Birmingham, for No. 2. It consisted of one lot of 1500 tons, two lots of 750 tons each, and lots of 300 to 500 tons each, all for shipment in the first half. A lot of 1500 tons of No. 2 soft for shipment this month was sold at $10, and an aggregate of 1100 tons of the same grade for first quarter was sold at the same price. The sale of warrants to cover 500 tons of high manganese iron is reported at $11 at furnace. From 750 to 1000 tons of regular fracture iron, under warrant, was offered on the basis of $10 for No. 2 foundry with a differential of 50c. per ton for No. 3, f.o.b. cars at furnace, which represents a concession of 25c. per ton from a $10 schedule when offered in certain quarters of the territory, owing to freight rate advantages. The inquiry, as a whole, was of a desultory nature, and at this time only comparatively small lots are pending. So far as can be ascertained, the resumption of foundry operations after the close-down for the holidays was general, and the movement from all furnace yards has increased. In one instance the entire stock has been moved and the daily output is being loaded into cars, while at a plant that has been idle for some months the yard has been cleaned of all grades. Within the week, one furnace was blown out for relining, and still another is scheduled to go out before the end of this month. In neither of the cases referred to has there been any announcement as to the blowing in of furnaces to take the place of those blown out. A change in operations at the North Birmingham plant will soon be made without increasing the output, and repairs to one of the City furnaces have just been completed. It is understood that the Hattie Ensley plant of the Sloss-Sheffield Company at Sheffield, Ala., will be repaired immediately in order to take the place of a stack that will have to be relined in the next few months. Furnace stock returns for January 1 are not in hand at this time, but conditions existing since the first of the year have not changed the views of selling interests to any

appreciable extent. All parties concerned are apparently content to await further developments, in which connection the result of efforts by local interests to secure lower freight rates from this district to Ohio and Mississippi River crossing points is being awaited with much interest. The market is quoted as below, f.o.b. Birmingham, for the entire first half, but, as is indicated above, higher asking prices are being maintained by certain producing interests:

No. 1 foundry and No. 1 soft	$10.50
No. 2 foundry and No. 2 soft	10.00
No. 3 foundry	9.50
No. 4 foundry	9.25
Gray forge	9.00
Standard basic	10.00
Off basic	9.50

Cast Iron Pipe.—An attractive tonnage, comparatively, in small lots, was placed, but the result of bids on larger contracts is not yet known. Contracts have just been placed for certain improvements to the plant of the United States Cast Iron Pipe & Foundry Company at North Birmingham, Ala., and it is understood that operations will probably be commenced June 1. Nothing definite is known of the plans to operate the plant at Sheffield, Ala. We continue to quote this market as follows, for water pipe, per net ton, f.o.b. cars: 4 to 6 in., $23; 8 to 12 in., $22; over 12 in., average $21, with $1 per ton extra for gas pipe. These prices are probably shaded for large municipal contracts.

Old Material.—A continued demand exists for wrought and steel grades, but with no transactions of unusual importance. The movement for the week was very satisfactory, especially to the smaller mills. We continue to quote the market as follows, per gross ton, f.o.b. cars:

Old iron axles (light)	$12.00 to $12.50
Old steel axles (light)	11.00 to 11.50
Old iron rails	11.00 to 11.50
No. 1 railroad wrought	10.00 to 10.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	6.00 to 6.50
No. 2 country wrought	5.50 to 6.00
No. 1 machinery	8.50 to 9.00
No. 1 steel	8.00 to 8.50
Tram car wheels	7.50 to 8.00
Standard car wheels	9.50 to 10.00
Light cast and stove plate	6.00 to 6.50

Finished Material.—From a local standpoint, the market is in a very satisfactory condition, with the volume of business increasing. It is understood on good authority that the Ensley mill will be kept in steady operation for some months to fill orders in hand, while the Bessemer mill continues to work a double shift. The Alabama City plant is well supplied with orders for the wire fencing and nail departments, and the output from the rolling mill at that plant is being moved.

The charcoal iron furnace of the Eagle Iron Company at Attalla, Ala., has been blown out for relining.

The Alabama Consolidated Coal & Iron Company, has blown out its No. 2 Ironton furnace for relining. No. 1 furnace at that plant is also idle.

Boston

BOSTON, MASS., January 9, 1912.

Old Material.—The demand is fully as strong as it has been, turnings and borings moving more actively than the remainder of the list. Prices show no change. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$9.50 to $10.00
Low phosphorus steel	11.45 to 11.95
Old steel axles	14.00 to 14.50
Old iron axles	17.00 to 18.00
Mixed shafting	12.75 to 13.25
No. 1 wrought and soft steel	11.00 to 11.25
Wrought iron pipe	9.25 to 9.50
Skeleton (bundled)	7.00 to 7.50
Cotton ties	7.00 to 7.50
No. 2 light	4.50 to 5.00
Wrought turnings	5.00 to 5.50
Cast borings	4.50 to 5.00
Machinery, cast	12.50 to 13.00
Malleable	9.25 to 9.75
Grate bars	6.00 to 6.50
Stove plate	8.00 to 8.50

The German Iron Market

BERLIN, December 28, 1911.

The activity of the iron trade has apparently been but little affected by the holiday season. The firmness of prices continues. It now transpires that the Pig Iron Syndicate several days ago raised the price of Luxemburg hematite and iron, owing to the recent advance of prices in England. It is reported that the syndicate will about the middle of January declare business open for the second half-year. A slight advance on Luxemburg iron is looked for and other advances will be made if the Coal Syndicate should raise the price of coke, which seems not improbable. The export market for steel bars has received a fresh impulse within a week, and prices have risen several marks. It is reported that export houses in Berlin and Hamburg have bought large lots of Belgian bars for the foreign trade. The cause for buying there was, presumably, that German mills were too busy to fill orders on time, they being now sold out for the first half of the year.

The report of the Steel Works Union on shipments of class B products in November shows a new record for plates, while bars, rods, tubes, castings and forgings were shipped at about the same rate as in October, hence the figures are slightly lower for the shorter month. Shipments of plates reached 104,469 tons, against 101,828 tons in October.

The shipments of the Siegerland ore association in November were heavier than for October, and it is reported that the demand for ores has grown more active this month. That district will soon begin shipping ores to the Silesian iron district, which will be a new thing in the history of the trade there.

There is nothing new to report regarding the negotiations for the renewal of the Steel Works Union, though newspaper discussions of the matter are growing visibly more pessimistic. The big claims for increased allotments are a sufficient explanation for this. The idea of leaving class B goods entirely outside of the syndicate arrangement is being further discussed with favor. Moreover, as nearly all the big companies have now become consumers of their own steel, having built or annexed mills for turning out the more finished products, it is pointed out that these great establishments have less interest than hitherto in the Union itself. They are in a position, it is argued, to dispense with its assistance. Talk of this kind is evidently designed to prepare the way for giving a quietus to the combination.

The rising tendency is indicated by the fact that the Union has just reduced by 5 marks a ton the drawback paid by it on exports of black sheets; and by the additional fact that the Coal Syndicate has abolished its drawback of 1.50 marks a ton on coal consumed in manufacturing finished steel for export. This action in both cases means that higher prices on export orders must be demanded by makers. These changes were made owing to the recent advances of prices in foreign markets, which, it is explained, render artificial assistance to the export trade no longer necessary in the same degree as hitherto. The drawback on sheets remains at 15 marks a ton after this reduction.

St. Louis

ST. LOUIS, MO., January 8, 1912.

The market here shows a little slackening in demand and during the past week the contracts made have not been large nor numerous. There has, however, been no softening of prices. The general feeling is that as soon as the year's business really sets in there will be considerable activity—much more, in fact, than prevailed at the same period a year ago.

Pig Iron.—The forward movement of pig iron under contract continues up to the written requirements and in some cases in excess, indicating that the consumption is continuing good. The largest sale of the week was 800 tons of Southern for first half delivery. Other sales have been carloads. Practically nothing is doing in Northern iron. There is some feeling that there will be few heavy buyers in the market until second quarter requirements begin to be felt.

Coke.—A considerable tonnage is going forward, but no important new contracts are being made. The largest sale of the week was 300 tons for first half delivery, while carload orders were not particularly numerous. By-product coke is higher, $5.20 being the best quotation to-day.

Finished Iron and Steel.—The demand is quiet, but the shipments going forward are up to the mark. In

standard rails nothing has eventuated except the release for May and June delivery of 5000 tons by the Frisco. Light rails are moving but slowly, though the severe cold wave is expected to bring the coal mines into the market soon. The lumber companies are doing absolutely nothing. Bars and plates continue without change. Track fastenings have been very quiet.

Old Material.—The Missouri Pacific, Frisco, Eastern Illinois and Wabash lists, about 3000 tons in all, went at considerably higher prices than expected and practically all to dealers, who are now confronted with a disinclination on the part of buyers to take any more scrap at present prices. It appears likely that there will be a bit of a struggle to see who can stay the longest. This week the Mobile & Ohio has a list of about 400 tons. The impression is that the severe weather, through cutting off the gathering of scrap, will save the dealers by sending prices up again. We quote dealers' prices, per gross ton, f.o.b. St. Louis, as follows:

Old iron rails	$14.00 to $14.50
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft	11.50 to 12.00
Relaying rails, standard section, subject to inspection	22.50 to 23.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00

The following quotations are per net ton:

Iron fish plates	$12.50 to $13.00
Iron car axles	18.50 to 19.00
Steel car axles	16.50 to 17.00
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Railway springs	10.25 to 10.75
Locomotive tires, smooth	14.00 to 14.50
No. 1 dealers' forge	8.00 to 8.50
Mixed borings	6.50 to 7.00
No. 1 busheling	9.50 to 10.00
No. 1 boilers, cut to sheets and rings	8.50 to 9.00
No. 1 cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.50 to 9.00
Railroad malleable	9.00 to 9.50
Agricultural malleable	7.50 to 8.00
Pipes and flues	8.50 to 9.00
Railroad sheet and tank scrap	8.50 to 9.00
Railroad grate bars	8.00 to 8.50
Machine shop turnings	7.50 to 8.00

New York

NEW YORK, January 10, 1912.

Pig Iron.—The market has been very quiet in the past week and it is evident that melters of foundry iron are now pretty well covered for the next two or three months and many of them for most of the first half. There are no indications of an increasing melt of iron in foundries in this district or in New England. One large company which buys in New York for plants in the Chicago district, as well as in the East, has been taking some lots of foundry iron, a considerable part of the business going to furnaces at Chicago. In Eastern Pennsylvania considerable sales of foundry iron were made by a steel making company in December, but the buying movement seems to be tapering off. One New York State furnace that has been a seller at rather low prices has advanced its quotations, and in general the market is firmer. Buffalo furnaces as a rule have put their quotations up from 25 to 50 cents. For shipments out of that district $13.50 for No. 2 X is now the general minimum for first quarter and in one or two cases $13.75 is asked for shipment over the first half. Canadian foundries bought heavily in November and are not likely to be a market factor soon. Quotations are as follows for northern iron at tidewater: No. 1 foundry, $15 to $15.25; No. 2 X, $14.75 to $15; No. 2 plain, $14.50 to $14.75. We quote southern iron at $15 to $15.25 for No. 1 foundry and $14.50 to $14.75 for No. 2.

Finished Iron and Steel.—A very large building project virtually came into the market unexpectedly Tuesday morning in the shape of a skyscraper of perhaps 60 stories or more, to take the place of the burned structure of the Equitable Life Assurance Society, 120 Broadway, New York. The idea of razing the destroyed monumental building has long been considered and now it is certain that the valuable plot of ground will be left idle no longer than necessary. The lofty building of the general scope mentioned would probably require 30,000 to 40,000 tons of steel. The 86-mile railroad from Palmer, Mass., to Providence, R. I., for the Southern New England Railroad of the Grand Trunk system, will probably bring into the market perhaps in a month inquiries for 6000 tons of structural material and 10,000 to 12,000 tons of rails. The electrification of the New Haven Railroad from Stamford, Conn., to New Haven, which will require considerable structural material, does not yet seem to have been provided for financially and is, therefore, not regarded as of definite character. Generally speaking, there seems to be no improvement in financial sentiment toward launching new propositions, but there is a strong undercurrent sustained by the more generally stable prices and by additional closure of pending projects. New inquiry is scarce and many lines still show the effects of the inventory season. The plate market has very little to encourage it in the East, the business still running in small lots. Of recent awards mention may be made of the Bing & Bing building, Twentieth street and Broadway, 5000 tons, to A. E. Norton Company; Hess loft building, Twenty-sixth street and Fourth avenue, 4000 tons, Hay Foundry & Iron Works; Brearley School, Park avenue, 700 tons, Milliken Bros.; St. Joseph Convent, Brentwood, L. I., 800 tons, Payne Bros., Waverley, N. J.; New York Central terminal area, 800 tons, Jones & Laughlin Steel Company; Rosdorf loft, West Twenty-fourth street, 500 tons, Milliken Bros.; the Delaware, Lackawanna & Western Railroad, 7500 tons, including the Buffalo terminal, Lackawanna Steel Company; General Chemical Company, Shadyside, Pa., 500 tons, Pittsburgh Bridge Company; Risley Hall, Cornell University, 300 tons, Seneca Engineering Company; University Club, Washington, 450 tons, Barber & Ross, Washington; gymnasium for Bowdoin College, 200 tons, New England Structural Company; bascule bridge for the New Haven Railroad at Buzzard's Bay, 500 tons, Boston Bridge Works. The Hedden Iron Construction Company, Newark, is low bidder for 500 tons for the Central of New Jersey pier in New York. The steel work will probably shortly be settled for a building at Forty-second street and Broadway, Thompson-Starrett Company, contractor, requiring perhaps 1500 tons. Bids have been asked for 1200 tons for an abattoir on Eleventh avenue and Forty-seventh street. The Pennsylvania Steel Company has closed for 5000 tons of rails for a street railway in Massachusetts. Quotations are: Steel bars, plates and plain structural material, 1.31c. to 1.36c.; bar iron, 1.27½c. to 1.32½c., all New York. Plain material from store, New York, 1.60c. to 1.70c.

Cast Iron Pipe.—The city of Grafton, W. Va., opens bids to-day on 1280 tons; Lowell, Mass., January 15, on 450 tons of 6 to 12 in.; New Brunswick, N. J., January 15, on 300 tons; the Department of Water Supply, Gas & Electricity, New York, January 17, on a quantity of 20 and 36 in. Foundries report a continued good demand from private buyers. Order books are steadily getting in better shape and prices are undoubtedly firmer. Carload lots of 6 in. are held at $22 to $23 per net ton, tidewater.

Old Material.—Local dealers report a moderate volume of business. No transactions of magnitude have come out. Some features of interest have developed, one of which is that consumers are showing a little more interest, but, as might be expected in view of heavy contracts booked for finished products at low prices, they are resisting any further advance in prices of old material. Another point of note is that few of the local dealers have been able to secure any part of the railroad offerings made this month. Evidently better prices have been obtained in Pittsburgh and vicinity, and railroad material has been diverted in that direction. The severe winter weather is now having a retarding effect on the loading of scrap, and this makes the available stock less plentiful than it has been. Dealers' prices, per gross ton, New York and vicinity, are unchanged from last week as follows:

Old girder and T rails for melting	$10.25 to $10.50
Heavy melting steel scrap	10.25 to 10.50
Relaying rails	20.50 to 21.00
Rerolling rails (nominal)	12.00 to 12.50
Standard hammered iron car axles	20.00 to 20.50
Old steel car axles	15.50 to 16.00
No. 1 railroad wrought	12.50 to 13.00
Wrought iron track scrap	12.00 to 12.50
No. 1 yard wrought, long	11.00 to 11.50
No. 1 yard wrought, short	10.25 to 10.50
Light iron	4.75 to 5.00
Cast borings, clean	6.50 to 6.75
Wrought turnings	7.00 to 7.50
Wrought pipe	9.75 to 10.00
Old car wheels	12.00 to 12.50
No. 1 heavy cast, broken up	11.00 to 11.50
Stove plate	8.75 to 9.00
Locomotive grate bars	9.00 to 9.50
Malleable cast	10.00 to 10.50

Ferroalloys.—The week has been quiet in ferroalloys. Prices quoted are firm at $41, Baltimore, for 80 per cent. ferromanganese and $70, Pittsburgh, for 50 per cent. ferrosilicon.

The Helwig Mfg. Company, St. Paul, Minn., reports a very satisfactory business the past year. Its factory is working overtime to meet the increasing demand for pneumatic staybolt clippers, pneumatic hammers, close-quarter air drills and other labor-saving devices.

Metal Market

NEW YORK, January 10, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Jan.	Lake.	Electro-lytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
3	14.25	14.12½	42.15	4.45	4.35	6.35	6.20
4	14.25	14.12½	42.37½	4.45	4.35	6.35	6.20
5	14.37½	14.25	43.30	4.45	4.35	6.35	6.20
6	14.50	14.37½	....	4.45	4.35	6.40	6.25
8	14.50	14.37½	43.40	4.45	4.35	6.45	6.30
9	14.62½	14.50	43.50	4.45	4.35	6.50	6.35
10	14.62½	14.50	43.50	4.45	4.35	6.50	6.35

Copper is firm and higher, although it has been called for only moderately by consumers during the week. Spot tin is scarce and prices show a rising tendency. Lead is unchanged with little movement. Spelter is higher and stocks are low. Antimony continues dull.

New York

Copper.—With a moderate domestic demand, copper is firm at a higher level. It will remain so and possibly go higher, bolstered up by the very favorable showing of the Copper Producers' Association issued yesterday. The figures show the remarkable fact that consumption is running much ahead of production, as stocks on January 1, which consisted of 89,454,695 lb. of copper, fell off 22,300,493 lb. from December 1. In the face of the Producers' statement, London cables this morning show that copper had declined 17s. 6d. for both spot and futures, which was ascribed to the belief that the statement had been discounted. The business done last week was uniformly light so far as domestic consumers are concerned. January 4 brought a better demand for small lots of electrolytic which started an upward tendency. January 5 the market was stronger but only moderately active. This week the buying has been light. In London spot copper sold to-day at £63 5s., and futures at £64. The exports of copper this month have been 6565 tons. Lake copper is quoted to-day at 14.62½c. and electrolytic at 14.50c.

Copper Averages.—The Waterbury average for the month of December was 13.87½c. The average price of Lake copper for December was 13.84⅜c. and electrolytic, 13.68¾c.

Pig Tin.—A good demand for spot and nearby tin developed immediately after the first of the year. The demands were satisfied and this week brought an end to the activity. Buyers have appeared to be holding off in order to start the new year with low stocks. January 3 spot tin broke £10 and futures £3 5s., there being no short interest in tin and the syndicate failing to support the market. The drop abroad caused irregularity here but the market was quickly steadied under the influence of a fair demand for small lots of spot. The present feature of the tin market is the scarcity of spot tin and it is expected that this condition will last throughout the month of January. There are many dealers out of the market owing to their having no supplies. A fair business is being done in futures for February, March and April delivery to dealers and consumers alike. Spot tin is quoted in London to-day at £191, against £201 January 2; futures, £185 10s. The arrivals of tin this month are 955 tons and the amount afloat is 1695 tons.

Tin Plates.—There has been little change in the tin plate market. Prices are steady and specifications on contracts are coming more freely to the mills for late winter and early spring delivery. Canners are expected to take unusually large quantities of tin plates. The price of tin plates laid down at Swansea, Wales, is unchanged at 13s. 7½d. In New York the price for 100-lb. coke plates remains at $3.64.

Lead.—The lead market is quiet and has been so since last report, with prices stationary at 4.45c., New York, and 4.35c., St. Louis. There is a feeling that buying for the spring trade will commence very soon.

Spelter.—Spelter has developed greater strength, which is not due to any considerable increase in demand, but rather to the fact that producers are well filled with orders which will carry them to early spring and stocks are declared to be low. What demand there has been was principally for immediate delivery.

Antimony.—There has been no activity worthy of note in this metal. Prices are unchanged as follows: Cookson's, 7.75c. to 7.87½c.; Hallett's, 7.60c. to 7.70c.; Hungarian and Chinese grades, 7c. to 7.12½c.

Old Metals.—The market continues firm, the demand being good. Dealers' selling prices are maintained as follows:

	Cents per lb.
Copper, heavy and crucible	13.50 to 14.00
Copper, heavy and wire	13.25 to 13.50
Copper, light and bottoms	12.00 to 12.25
Brass, heavy	9.25 to 9.50
Brass, light	7.25 to 7.50
Heavy machine composition	11.25 to 11.50
Clean brass turnings	8.75 to 9.00
Composition turnings	9.50 to 10.00
Lead, heavy	4.25
Lead, tea	4.00
Zinc, scrap	5.25

Chicago

JANUARY 8.—The heavy buying of copper has instilled a pronounced element of strength in the market prices of this metal and the expectation is that the highest levels have not yet been reached. In other metals interest has been negative. We quote at Chicago as follows: Casting copper, 14.50c.; Lake, 14.75c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 44.50c.; small lots, 46.50c.; lead, desilverized, 4.40c. to 4.45c., for 50-ton lots; corroding, 4.55c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.30c. to 6.40c.; Cookson's antimony, 8.75c., and other grades, 7.75c. to 8.25c., in small lots; sheet zinc is $8.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount, in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 11.75c.; copper bottoms, 10.75c.; copper clips, 11.50c.; red brass, 11c.; yellow brass, 8.50c.; lead pipe, 4c.; zinc, 4.25c.; pewter, No. 1, 26c.; tinfoil, 33c.; block tin pipe, 38c.

St. Louis

JANUARY 8.—The demand has been fair. Lead is a shade weaker and is quotable at 4.35c., while spelter is a bit better at 6.35c. The tin quotation is 43.70c.; Lake copper, 14.55c.; electrolytic, 14.55c., and Cookson's antimony, 8.22½c. The zinc output has been curtailed severely by the cold weather and virtually all small mines and unsheltered wash places have had to abandon production temporarily. The opening of the new year is on a much better basis than a year ago, with prices higher than then and tending upward instead of downward as in 1911. On miscellaneous scrap we quote as follows: Light brass, 4.50c.; heavy brass and light copper, 8.50c.; heavy copper and copper wire, 9.50c; zinc, 3.50c.; lead, 3.50c.; pewter, 20c.; tinfoil, 29c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, January 10, 1912.

In the period since last report the stock market displayed sustained strength until Tuesday, when heavy selling depressed prices. Virginia Iron, Coal & Coke has fluctuated widely. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com	1 - 1⅛	Pressed Steel, com.	33¾ - 34¼
Allis-Chalm., pref.	7⅜	Pressed Steel, pref.	102½
Baldwin Loco., pref.	103¾-104	Railway Spring, com.	32
Beth. Steel, com.	31 - 32	Railway Spring, pref.	101
Beth. Steel, pref.	59⅜- 61⅝	Republic, com.	25¼- 26¾
Can, com.	11⅝- 12⅜	Republic, pref.	85 - 85¼
Can, pref.	91⅛- 94¾	Pipe, com.	16 - 17
Car & Fdry., com.	53 - 55⅛	Pipe, pref.	50
Car & Fdry., pref.	116 -116½	U. S. Steel, com.	65⅞- 69⅜
Steel Foundries	34½- 35½	U. S. Steel, pref.	110¼-111½
Colorado Fuel	26⅞- 27⅜	Westinghouse Elec.	66¼- 70¼
General Electric	155 -158	Va. I. C. & Coke	75 - 90
Gr. N. Ore Cert.	40¾- 44¼	Am. Ship, com.	48½
Int. Harv., com.	108¼-109¾	Chi. Pneu. Tool.	47⅛- 48¾
Int. Harvester, pref.	118¾	Cambria Steel	42⅞ 44⅛
Int. Pump, com.	33¼	Lake Sup. Corp.	27⅛- 28¼
Int. Pump, pref.	83¼- 83¾	Pa. Steel, pref.	101½-102
Lackawanna Steel	103	Warwick	11¼- 11½
Locomotive, com.	36⅛- 36¾	Crucible Steel, com.	12¼- 12⅝
Nat. En. & St., com.	14 - 14½	Crucible Steel, pref.	82⅛- 83½
Pittsburgh Steel, pref.	102½	Harb. Walk Ref., pref.	100

A recent circular of a New York banking house relating to the preferred stock of the Bucyrus Company of Wisconsin says that the new plant at Evansville, Ind., to cost $400,000 and to be completed early in 1912, will manufacture the lighter types of excavating machinery formerly manufactured by the Vulcan Steam Shovel Company, of Toledo, Ohio. The gross sales of the Bucyrus Company increased from $2,037,979 in the year ending April 30, 1909, to $2,920,357 in the year ending April 30, 1911. The profits in the two years were respectively $290,239 and $420,366. It is stated that the South Milwaukee plant when operating full will employ 1600 men and the Evansville, Ind., plant 800. The capital outstanding is $4,000,000 of 7 per cent. cumulative preferred stock and $4,000,300 common stock. There is held in the treasury $1,000,000 of preferred and $999,700 of common stock.

The Carbon Iron Company, Pittsburgh, desires to locate the owners of the company's first and second mortgage bonds, issued April, 1892, and due April, 1912. All holders have been requested to communicate with President Charles McKnight at 901 Penn avenue, giving their address and the number of bonds held.

Dividends Declared

The Standard Underground Cable Company, Pittsburgh, regular quarterly, 3 per cent. and extra 3 per cent.

The American Nut & Bolt Fastener Company, Pittsburgh, quarterly, 5 per cent.

The Pittsburgh Coal Company, quarterly, 1¼ per cent. on the preferred stock, payable January 25.

The International Steam Pump Company, regular quarterly, 1½ per cent. on the preferred stock, payable February 1.

J. G. White & Co., Inc., New York, regular quarterly, 1½ per cent. on the preferred stock, payable February 1.

Personal

Frank W. Hutchings, well known among the leading foundrymen of the country as the efficient secretary of the National Founders' Association, has been elected treasurer of the Lake Superior Iron & Chemical Company, Detroit, Mich., the new connection becoming effective January 1. Mr. Hutchings succeeds A. Van Oss, who has resigned to go into other business. Announcement is also made of the election of H. H. Bingham as auditor of the Lake Superior Iron & Chemical Company.

James A. Scully, works superintendent for the Whiting Foundry & Equipment Company, Harvey, Ill., and George E. Jones, who has had charge of inspection, superintendence of outside erection and complaint adjustments for the same company, have resigned, effective January 6. They have organized the firm of Scully, Jones & Co., Chicago, to conduct a business in foundry equipment and supplies, machinists' supplies, and railroad appliances.

The directors of the Westinghouse Electric & Mfg. Company have elected Guy E. Tripp, of Boston, as chairman of the board, to succeed the late Robert Mather. Mr. Tripp is a member of the firm of Stone & Webster, engineers and railroad managers.

Dr. P. Heroult, 149 Broadway, New York, inventor of the Heroult electric furnace, has returned from an European trip.

F. D. Weeks, consulting metallurgist of the Metallurgical Company of America, 52 Broadway, New York, is in Germany visiting the works of the parent company, the Metallbank and Metallurgische Gesellschaft, Frankfurt-on-the-Main.

S. B. Redfield, formerly associate editor of the American Machinist, has become connected with the Ingersoll-Rand Company as engineer of tests at its plant at Phillipsburg, N. J.

William A. Mazuri, formerly superintendent of the Braddock Machine & Mfg. Company, Braddock, Pa., has resigned to accept the position of sales manager of the National Steel Castings Company, Montpelier, Ind. He will have his headquarters at Ft. Wayne, Ind.

P. W. Gates, president of the Hanna Engineering Works, Chicago, will sail January 20 on the Franconia from New York for an extended Egyptian trip, expecting to return about the middle of April.

Frank B. Foster, for several years purchasing agent of the Midland Steel Company and the S. Jarvis Adams Company at Pittsburgh, with their allied interests, has assumed his new duties as manager of sales of the S. Jarvis Adams Company, with offices in the German National Bank Building, Pittsburgh, Pa.

Gust. Pers Wern, who for several years was New York manager of the hoisting engine department of the Mead-Morrison Mfg. Company, resigned that position January 1.

F. H. N. Gerwig, formerly assistant general manager of the Carrie blast furnaces of the Carnegie Steel Company, but who resigned, effective January 1, to become general superintendent of the blast furnaces to be built by the Pittsburgh Steel Company at Monessen, Pa., was presented by the employees of the Carrie furnaces with a chest of silver, containing about 200 pieces, and a solid silver tea service.

H. A. Barren has been appointed general superintendent of the blast furnaces and steel works of the American Steel & Wire Company in the Cleveland and Pittsburgh districts, succeeding J. W. Carpenter, resigned. B. D. Quarrie has been appointed general superintendent of the Newburg steel works and blast furnaces of this company at Newburg, Ohio, succeeding H. A. Barren, promoted.

Arthur V. Davis, president of the Aluminum Company of America, Pittsburgh, has returned from Europe.

Robert Porter has been appointed superintendent of the new 90-in. plate mill and the 14 and 16-in. continuous mills of the Republic Iron & Steel Company, Youngstown, Ohio, succeeding H. J. Steinbreder, who recently resigned to become connected with the Laclede Steel Company, St. Louis.

S. Griswold Flagg, 3d, on January 1, was admitted to membership in the firm of Stanley G. Flagg & Co., Morris Building, Philadelphia, Pa.

President James A. Farrell, of the United States Steel Corporation, and Vice-Presidents Kerr and Reis have been on an inspection trip the past week, covering plants at Cleveland, Lorain, Pittsburgh and Youngstown. At Cleveland Mr. Farrell made an address at the annual dinner of the Pittsburgh Steamship Company, given by its officers to its vessel captains Wednesday evening, January 3. The Lorain works of the National Tube Company were visited on Thursday the Ohio works at Youngstown on Friday, and on Saturday night Mr. Farrell spoke at the Carnegie Steel Company dinner at Pittsburgh.

Chairman E. H. Gary, of the United States Steel Corporation, recently resigned as chairman of the board of the American Steel Foundries. Announcement has been made of late also of his withdrawal from official connection with the Allis-Chalmers Company, of which he has been chairman for several years.

Harry E. Higgins, for a number of years well known in the sheet and plate trade in the Central West as general manager of the Cleveland Steel Company, Cleveland, Ohio, is now connected with the Otis Steel Company and will be an officer of the company after its organization under Ohio laws, as recently referred to in these columns.

C. H. Kenzel, assistant purchasing agent of the Elgin, Joliet & Eastern Railway Company, Chicago, Ill., has been promoted to the position of purchasing agent.

Hollinshead N. Taylor, a great-grandson of one of the founders of the business, was on January 1 admitted as a partner in the firm of N. & G. Taylor Company, tin plate manufacturer, Philadelphia, Pa., established in 1810.

John H. Guess has been appointed general purchasing agent of the Grand Trunk Railway System, Montreal, vice A. Butze, retired under the provisions of the pension fund, and R. Johnson has been appointed assistant general purchasing agent.

English Pig Iron Warrants Decline

The English pig iron warrant market has seen a rather excited speculation in the past 10 days. On December 28 Cleveland warrants reached 50s. 10½d., the high point of the recent movement. Declines followed, and under heavy selling the close on January 9 was 49s. 6d. The sale of 10,000 tons of Alabama iron by the Republic Iron & Steel Company for export to England is reported to have been a factor in the decline. Yet the price for this iron is understood to have netted the full equivalent of sales to domestic consumers.

The list of active blast furnaces in the Pittsburgh district was unchanged throughout December except that two of the Edgar Thomson group were off for about 10 days. The production for the 38 furnaces in the 31 days of December was 478,623 tons against 474,266 tons for the same furnaces in the 30 days of November.

The Politico-Economic Side of Steel Making

A Chemist's View of Some Extra-Laboratory Problems Including That of the Trusts and of the Fruits of "Over-Investment"

BY GEORGE AUCHY

The American steel maker is in business, not for the benefit of humanity, but for the benefit of himself. He makes steel to make money, although he sometimes misses connections with his ultimate aim. This being true, the most important problem to him is not the problem of making his steel cheaply (although that is a highly important one), but the problem of getting it sold and at a fair price after it is made—good times and brisk trade, in other words. Therefore, if his chemist wishes to make himself useful in other ways than the very humble and limited way of chemical analysis, it is well for him (perhaps better than vainly vying with the practical engineers in practical engineering) to make some study of political economy and some attempt at interpreting the economic signs of the times. The following is the writer's effort to that end:

The Steel Maker's Attack on the Problem

Although the steel maker is at times hard pressed by the demand for his product, and is kept busy rushing out mighty tons of necessarily mediocre stuff, yet at other times just the reverse of this holds good, and he can hardly sell anything at any price. In the effort to increase the profits of good times and to lessen the losses of bad times the steel makes has tried four expedients. He has (1) secured protection from foreign competition; (2) on occasion he has thrown quality to the winds while he feverishly dumped his steel out of the ladle and "squirted it through the rolls"; (3) made the most wonderful improvements in the manufacture and handling of his products; and when all these have failed he has (4) formed a great combination of domestic interests to lower costs and steady prices, which last expedient, in the writer's opinion, must also fail in time, however successful so far. For in the face of a light demand, or a constantly decreasing demand relatively to costs and capital engaged, the mightiest trust is obviously as helpless to make money as the feeblest infant. It can fix its prices high, but cannot force an unwilling or an incapable public to buy at those prices, and the great gain to those in the trust at the present time is probably a gain solely from co-operation and resulting economies, and under present laws this gain in time must fade away before the inexorable influence of relatively decreasing demand and increasing cost of raw material and royalties.

The Trust and Economic Laws

But although convinced of the ultimate futility of the trust as a money maker under present laws, the writer wishes nevertheless to say a word for it before going on with his subject.

In his opinion the popular outcry against the trust is on a par with the opposition of former times to labor-saving machinery. The trust, like labor-saving machinery, although not to the same extent, increases the productiveness of labor and capital; and although the trust in the long run can not increase the earnings of capital or the wages of labor (under present laws, always be it understood) just as labor-saving machinery has failed of these accomplishments, yet to decry it or to oppose it is as foolish and gratuitous as a war against machinery would be. Moreover, the trust violates absolutely no ethical principle whatever. If it is wrong, nothing is right, and we may as well prohibit everything and give up struggling.

Does the trust unite business interests previously warring? Warring interests have a right to unite. Does the trust undersell its competitors? It has a perfect right to do so. Does it then restore its prices to the normal level? It has a perfect right to do that also. Does it go even further and raise its prices abnormally? That also is its privilege, and it will undoubtedly act upon it if the market will stand it, and will not do so if the market will not stand it, and in neither case is it the Government's business, any more than it is its business to take note of the extortionate or otherwise charges of Jones & Robinson, plumbers, or of the 500 per cent. profits of Druggem & Killum, the corner apothecaries. If such practices (none of which the steel trust has been guilty of, however) are wrong, then all business is wrong. Every business man has the right to sell as low as he pleases, or as high as he can, and either the trust must be granted the same rights, or these rights must be withheld from all, and prices of everything, from pins to peanuts, be fixed by the Government—an obvious absurdity, not only on account of the magnitude of the job, but also because it is absolutely impossible (high authorities on both sides to the contrary notwithstanding) for the Government, or for anybody else, to tell what prices should be at any given time. That must be fixed by the higgling of the market. It is the duty of the Government to decide whether or not business partnerships are right in principle. That decided—as it was decided long ago—then, hands off!

The Trust and Price Fixing

But is the popular conception that the trust can fix prices to suit itself after all a true one? The writer, for his part, cannot believe it. Prices are fixed, it would seem, not by competition really, but by supply and demand; and whether the supply is supplied by capitalists in combination or in competition would seem to make no difference as far as price is concerned, except only that in the former case the retreat from high prices where necessary is an orderly one and not a rout. Over demand the trust has no control; and while it may have absolute control of supply, yet it would seem that it can never pay it to exercise that control and limit supply except only after prices have fallen to cost or below. For the obligation to make the interest on each individual block of capital in the trust is just as imperative united as separated, and it is difficult to see how outened fires and idle machinery can accomplish that end in either case. And it would seem that united capital at all times while prices are above cost must push its productive powers just the same as capital disunited. The writer can see how the trust can lower prices (by increased productiveness), but it is not at all clear to him how it can raise them abnormally.

Let us take a concrete illustration and see how the latter proposition sounds to us. Suppose in a certain country an iron and steel trust is formed and that, at the first meeting of the directors, the proposition is gravely advanced to destroy half the mills and furnaces in order to double prices of products. Suppose, further, that after this has promptly been voted down, another proposition along the same lines, but not so radical, is substituted, namely, to allow half of the mills and furnaces (the better half of them—for if it is really the idea of the trust to raise prices by limiting supply, then the older fashioned and more inaccessible the plant the better) to deteriorate and rust away in idleness in order to double prices. Although more alluring than the first proposition, it would seem that this, too, would never do. In the first place, it would on the face of it be contrary to all business sense to use a large amount of capital to bring forth a small amount of product. The whole industrial trend of the times is just the opposite of this, namely, to get the greatest possible production from a given amount of capital. And in the second place, it would never do to hold half of the capital idle, for the simple reason that prices would not double as a result. And the reason why prices would not double is because the higher prices are forced the less the demand, the greater the friction, therefore, against further upward progress, and finally a full stop long before the attainment of the goal, if not a disastrous and ignominious tumble altogether. Nature

abhors high prices, and he who fights against nature fights against a stubborn foe. Every business man knows how much more easily and quickly an article may be sold at a low price than at a high one. And the universal business tendency—and one so strong that the trust would be powerless to resist it—is to make money by selling as much, and therefore as cheaply, as possible.

The Trust Must Obey Nature

So the newly formed trust of our illustration would probably soon see that its problem was the same old problem as before; namely, how best to obey nature's command to cheapen. And the great advantage a trust gives is not an advantage over nature, and in defying nature, but an advantage in obeying nature. In other words, it increases the productive power of labor and capital just as labor-saving machinery does, and Mr. Morgan and his associates in the steel trust are entitled to the same credit that we unhesitatingly give the great inventors in mechanical lines; and the trust is perhaps one of the proudest achievements of modern industrial development.

Nevertheless, with all this granted, the writer believes that as a permanent cure for the evils and discomforts of hard times the trust is an utter, hopeless failure. That it cannot in the slightest degree prevent the recurrence of hard times is a proposition no one can successfully dispute. It therefore behooves the iron trade to carefully consider the causes of "hard times," "over-production," "cut-throat competition," etc.

Too Much Money Invested and Too Little to Spend

What is the reason for it all? The answer to this question, at first sight appallingly difficult, becomes after a little study absurdly simple—so much so, in fact, that the writer has to fear that his audience (if he has one) will, so to speak, rise up and hoot him off the platform for solemnly presenting anything so obvious. The very easy answer to our question is that hard times are primarily due to the fact that too much of the money in the country is invested (that is, used in the production of goods), thus leaving too little of the money of the country to be spent (that is, used in a demand for goods) —an unnatural and unhealthy condition of affairs. Capital (money invested) is the very life blood of the nation. But it must be in normal amount. If there is too little of it we starve. If there is too much of it, again we starve. Under right laws there could neither be too much nor too little of it—probably the amount of it would automatically adjust itself, so that there would not be, or not for long, either underproduction or overproduction of goods, any tendency to the former being met by money that otherwise would be spent being tempted into investments, and any tendency to the latter being met by money spent rather than invested.

The question, then, is what lies back of the fact that an undue proportion of the money in the country is unhealthily diverted into investments instead of being spent. Before taking up this question the writer wishes to explain that he is quite well aware of the fact that when money is invested it is also money spent, and constitutes therefore a demand for goods, thus at first stimulating trade just as much as the same money really spent—that is, spent for goods to be consumed instead of for goods to be used in producing more goods. But if the proportion is abnormal, only at first does money invested stimulate trade. When the buildings are up and the machinery bought the stimulus ceases and after that comes the deadly depression from overproduction of goods. It is like the dram to the toper. Of the money of the country a certain normal proportion should under healthy conditions be turned into capital—that is invested —and used to produce goods, leaving the remainder to be used for buying goods. And after the normal proportion has once been reached, then every dollar invested, instead of spent for what is to be consumed, is a blow struck at the prosperity of the country; it contributes to a business strain and tension that tightens year by year and squeezes manufacturer and workman as in a steadily closing vise, with trust economics affording only a temporary relief.

Why Is Investment Overdone?

Now, what is the cause of this abnormal tendency to investment? Again the answer is absurdly easy. It is obviously because the wealth of the country has concentrated and is concentrating still more into a few hands. Money which if left with the people would be spent and would constitute a demand for goods, massed up in the possession of a few, must be invested and used to produce goods, because it is a physical impossibility for these few to spend it however sumptuously they may live. A poor man could spend—and would spend if he had it—far more than he now has. A very rich man cannot spend even his income—not on himself, that is; and of course he will not spend it on others—although there is one very distinguished exception to this rule in a great steel maker of recent years, great peacemaker of present years, and one of the most wonderful personalities of all history. But probably (and quite properly) Mr. Carnegie is not steering perilously close to the shoals of penury in his benefactions. And at any rate he stands quite alone in his magnificent and unprecedented policy of spending a large part of his wealth for the benefit of his kind instead of investing it for the benefit of himself. So that, in general, it is safe to say that money segregated is money invested and not money spent. Left with the people it would have been money spent, and not money invested. In the one case it is money used to produce goods which in the other case would have been money used in buying goods. To illustrate: Suppose a million golden double eagles were to descend from heaven like manna for the benefit of all. What would be the effect on trade? Stimulative, of course; almost to the last dollar it would be spent and not invested. But now suppose that, instead of the people getting it, some alert and up-to-date millionaire should get up early in the morning and "scoop the whole outfit." In that case it would be all invested and none spent. What, then, would be the effect on trade? Also stimulative at first—quite as much so, in fact, as in the previous case. But after our millionaire had invested this million double eagles—in other words, had got his skyscrapers up, his rails laid, his furnaces built, his machinery installed, etc.—there would then be quite a different story, the same old story then of hard times, overproduction and cut-throat competition, but increased and aggravated by this fresh supply of goods added to an already overstocked market.

The Socialist's Answer

What, then, causes the wealth created by capital and the people to segregate in great masses, leaving the great majority of the people too poor to buy the goods the segregated wealth is set to producing? The socialist's answer is that the people are robbed by their "capitalistic employers." This answer, easy and superficial, is obviously drivel. Wages, it is true, are far too low (it is a mystery, indeed, how the workingman can live), but plainly the capitalistic employer is not to blame for it. He is paying all he can afford to pay under existing business conditions, and probably many a time has anxiously to scrape the till to meet his pay-day obligations. The robbers of the people are not the capitalists, nor even the monopolists. The robbers of the people are the people themselves through the instrumentality of certain foolish laws that they have passed—that they acquiesce in and stand for—laws that juggle the hard-earned, lonesome dollars out of their pockets into the pockets of a few already filled to bursting. The people, so to speak, have dug a deep hole for themselves, have jumped in and are busily burrowing deeper. Their capacity for imbecile law making is infinite and appalling, and their pockets are fairly bursting with drafts of future bills which the politicians will cheerfully enact into laws for them, and laws compared with which the Sherman law will shine as a high triumph of intellectuality.

What these foolish laws are that cause wealth to segregate and play the mischief with business might be the final inquiry of our investigation, but cannot be considered at this time on account of lack of space—they are at any rate sufficiently obvious if looked for.

But the writer cannot close this part of his subject without protesting against the narrow-sighted disposition

to consider the grateful beneficiaries of these laws as predatory rascals. What an utterly false view of the situation that is may best be seen by taking and examining carefully one of these laws of the people that lead to wealth segregation with its consequent overinvestment, overproduction, underdemand and hard times. Let us take the law imposing a tax on houses, which, although a minor one in its effects, well illustrates the point. It makes a poor man with nothing, probably, but a pay envelope or two between him and beggary or starvation in case of sickness or discharge pay a rich (probably absolutely rich, certainly relatively so) man's taxes for him. Yet what can the landlord do about it? Is he, then, a thief because he passes the tax that is levied on him on to his tenant instead of paying it himself? The writer himself owns a few mournfully small properties, and in passing the taxes on to his unfortunate tenants is upheld by a consciousness of absolute rectitude. For the man does not live who will build and rent a house simply for the fun of it, as he would be doing if he himself paid the taxes. He must make his interest or he will not build. And when the humble toiler discovers that he is the one who ultimately bears the burden, and appeals to the politician to make by main force the owner to pay his own taxes, as he most probably will do, the result will simply be, if the law is not a dead letter, to withdraw capital from tenement building, so that pretty shortly the humble toiler would find himself without a roof to his head.

It may be noted in passing that the workingman's ignorance of the fact that he is a taxpayer doubtless explains his amazing indifference to municipal robbery, jobbery and extravagance (by the way, a performance which also helps along the segregation of wealth). To him it seems to be something to be joked about merely, and nothing immediately concerning him. He rather admires, in fact, the clever rascals of his own party who grow rich in politics, although they toil not neither do they spin.

The Prosperity of All the Concern of All

In conclusion: The steel maker plainly makes a mistake in thinking that his own prosperity is a thing apart from the prosperity of his ultimate customers, the masses of the people. If they cannot buy, he cannot sell. He also makes a mistake in thinking the people can be trusted to work out their own salvation. They are as incapable of it as a pack of children. Somebody must cut away the millstones they have hung around their necks in the shape of ridiculous laws that cramp business and paralyze industry, and must prevent them from passing still more such laws. Still again he makes a mistake, the writer believes, in thinking the trust is a haven of refuge where he will be safe from the financial storms that have tossed and wrecked him in the past. It is a self-evident proposition that a trust can accomplish nothing if the people cannot buy the goods the trust produces. Not for long, probably, will trust economics serve to keep the wolf at bay under such conditions. There is one thing, and one thing only, it seems plain, that will lift business out of the slough and make financial panics and hard times bad dreams of the past, and that is to increase the buying capacity of the people and decrease the tendency to overinvestment. The stupid laws leading to wealth segregation must be ferreted out and repealed. If this is not done, nothing—protective tariffs, labor-saving machinery, improvements in production, trusts—nothing whatever will permanently avail and business will go on getting wound up tighter every year.

Foreign Competition for Large Pipe Contract.—J. G. White & Co., Inc., New York and San Francisco, whose purchase of 124 miles of 12-in. steel pipe, to be used in building a natural gas line for the Midway Gas Company in California, was mentioned in *The Iron Age* last week, state that the pipe will weigh approximately 11,000 tons, and, with transportation, will cost approximately $600,000. Quotations were asked from British, German and French manufacturers, and the best foreign price was that of a British firm, which, exclusive of duty and freight, was approximately double that at which the contract was placed with the National Tube Company, subsidiary of the United States Steel Corporation.

Beneficiating Lake Superior Ores

BY D. E. WOODBRIDGE

The works at Coleraine, Minn., for washing the lean, sandy ores of the western Mesaba produced in 1911 more than 1,800,000 tons, working from April 15 to October 18, a total period of 160 days, excluding Sundays. The actual average daily run was considerably in excess of the rated capacity of 10,000 tons of concentrates and the great mill has been most satisfactory in all respects. It was erected for separating ores mined under the Oliver Iron Mining Company's Canisteo lease and Walker ownership, but the mill has treated a very large tonnage from mines of the Great Northern lease.

The International Harvester Company's washing plant is under construction and will be ready by the opening of navigation. It is designed primarily to treat ores from Hawkins mine, where there are 20,000,000 tons or more of an ore amenable to this process. In all major essentials it is to be similar to the Coleraine works, but concentration will not be carried so far, there being no tables. It will cost $600,000 and will be 1800 tons of concentrates in 20 hours.

Another step in the betterment of Mesaba ores has been taken by the operation of drying plants by M. A. Hanna & Co. A small drier has been completed and is in operation at Hollister mine, near Crystal Falls, on the Menominee, and this has worked out so well that a second and larger one is now under way at Brunt mine, on the Mesaba. Hollister ore formerly carried more than 13 per cent. moisture; now it is 6 to 6.5 per cent., with a consequent saving in freight charge and a higher dried ore analysis. Brunt ore has a natural analysis of about 15 per cent. moisture, and this will be brought to 7 or 8 per cent. when the new works is in operation. The ore is quite clayey, with an assay of 5.70 per cent. silica and 4.87 per cent. alumina, and is difficult to handle wet. The Hollister works has a capacity for treating 15 tons per hour, while that at Brunt is intended to handle 80 tons per hour and will be doubled if it works as well as expected. It has been found that the dried ore takes up very little moisture in its passage to the lower lakes, and is received at furnace yards in good condition and improved by the treatment.

Still another step in fitting Mesaba ore for furnace use has been adopted by the Biwabik Mining Company, which has installed an immense crushing plant at its mine. The breaker put in at this mine is a Gates gyratory, No. 24, with a 48-in. opening for coarse ore. This size is needed in order to handle into the breaker any sized boulders of ore that a modern 3-cu. yd. steam shovel can lift.

The crushing plant of the Oliver Iron Mining Company, at Escanaba, Mich., has been operated more heavily the past year than for some time, and has treated about 200,000 tons of ore.

After extended experiments the Lake Superior Corporation, Sault Ste. Marie, Ontario, has begun the erection of a siderite roasting works at its Magpie ore body, some 12 miles inland from its Helen mine, Michipicoten district. The plant is designed to drive off carbon dioxide and sulphur and to raise the ore from a tenor of 35 to 49 per cent. iron to 55 or 57 per cent. In the meantime the sulphur contained, which is up to, say, 4 per cent. in the original rock, is reduced to unimportance. Five units are being installed, and it is expected that the average production of finished ore will be about 1500 tons per 20 hours, at a cost not exceeding 40 cents per ton.

For the pyritic magnetites of the Atikokan range, now used in the blast furnace at Port Arthur, Ont., roasting has been carried on for some little time, taking out the excess sulphur. For this purpose the ore is broken to 1-in. size and passed through a furnace that utilizes the blast furnace gases.

Last summer, on account of a cavein at Helen mine, Michipicoten, some 350,000 tons of ore was broken in the mine down above the 700-ft. level and mixed with the pyritic sand that had been kept separate up to that time. This pyrite is carried in pipes and pockets throughout the mine and it has been the custom at that mine to take it out separately from the ore. On account of the mixing of the materials it has been necessary to install a washery, and all ore shipped recently has been washed.

The magnetite deposits of Moose Mountain and their dressing by the Grondal process have been mentioned quite recently. The Moose Mountain, Ltd., as the ore company is named, has a very large tonnage of lean magnetic ore, in addition to its higher grades of ore that are merchantable in their natural state, and expects to increase the capacity of its concentrators as time passes and the demand grows.

For the concentration of hematite ores, not of a nature to permit the use of magnetic processes, the Jones Step Furnace Company is erecting a works at Kloman mine, Marquette range, that is expected to be ready for use soon. This plant differs somewhat from any that Mr. Jones has yet tried. If it is successful, hundreds of millions of tons of low grade hematites around Lake Superior will become amenable for treatment.

At Mayville, Wis., the Northwestern Iron Company is mining a hematite ore that breaks into a large proportion of fines. Difficulty has been experienced in charging this material into the furnace and making it stay. During the year a Grondal briquetting plant has been built there, consisting of four ovens, each of 100 tons per 20 hours capacity.

These comprise, as far as the writer knows, all the works now built or under way around Lake Superior for beneficiating raw iron ores. M. A. Hanna & Co. are constructing a concentrating works in eastern Ontario, but that cannot be classed as in the Lake region. Taken together, they indicate a remarkable movement and one of the greatest significance. Their bearing on the tonnage of available reserves of the region cannot be overestimated.

Pittsburgh and Vicinity Business Notes

The Garland Corporation, Pittsburgh, has received contracts for supplying electric conduit for the Woolworth Building now being erected at Park Place and Broadway, New York City, and for the 22 stories being added to the First National Bank building, Wood street and Fifth avenue, Pittsburgh.

The National Fire Proofing Company, Pittsburgh, has acquired the properties of the Great Eastern Clay Company at South River, N. J., comprising three large plants, and said to be the largest individual producer of conduits in the world for carrying wires and cables underground, and also an important manufacturer of glazed ware, sewer pipe, building blocks and flue linings.

The Atlantic Engine Company, recently organized to build gas and gasoline engines, both air and water cooled, will turn out its product in the plant of the Phoenix Iron Works Company, Meadville, Pa. In addition to engines, it will build a standard portable combination woodworker, which unites in one machine a rip saw, cut-off saw, molder jig saw, emery wheels, dado head, jointer, sander and borer. No new buildings will be erected at present, but new equipment, such as lathes, drills, etc., will be purchased.

The Pittsburgh Lamp, Brass & Glass Company, Pittsburgh, which went into the hands of receivers some time ago, has been reorganized and the receivership practically terminated. The holders of the $300,000 first and $500,000 second mortgage bonds have agreed to an extension for five years without any other payment than interest. Holders of the $750,000 common and $750,000 preferred stock have loaned the company sufficient money for four years to take care of pressing indebtedness and to provide adequate working capital. The banks holding loans aggregating about $490,000 have agreed to an extension for three years.

The Stiles Mfg. Company, Parkersburg, W. Va., and the Miami Valley Machine Tool Company, Dayton, Ohio, will consolidate this month under the name of the Miami Machine Company. Engines, lathes, drill presses, woodworking machinery, grinders and belt sanding machinery will be manufactured, and a large foundry and machine shop will be operated. No new machinery will be needed.

The large additions under way for some time by the Union Steel Casting Company at Pittsburgh have about been completed, and were put in operation last week. The company added two new 25-ton open-hearth furnaces and other equipment. D. A. Snyder is superintendent.

The Erie Engine Company, Erie, Pa., is taking bids on a new 2-story brick, steel and concrete power plant to be erected at Erie, Pa., at a cost of $200,000.

The plant of the Central Tube Company at Economy, Pa., shut down for five days recently, on account of rebuilding furnaces, has again started up, and with a large number of orders for pipe and tubes on its books. It employs about 250 men.

The Ohio Steel & Wire Company, Warren, Ohio, has placed a contract for the erection of its plant with the Hohloch-Beiling Company, Youngstown. The building will be of steel, concrete and brick construction, fireproof throughout. All purchases of machinery have been made and the plant is expected to be in operation in May or June.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received an order for the complete equipment of three rotary converter substations and one transformer substation on the Kansas City, Clay County & St. Joseph Railway Company. The road runs from Kansas City to St. Joseph, with a branch from Kansas City to Excelsior Springs, representing a total operating mileage of 80 miles. The same company has received other orders for electrical equipment as follows: Georgia Railways & Electric Company, Atlanta, Ga., 27 double equipments of motors and controllers; Public Service Railway Company, Newark, N. J., two double equipments of motors, equipped with control, and from the Cincinnati & Portsmouth Railway Company, Cincinnati, Ohio, two controllers.

The William B. Pollock Company, Youngstown, Ohio, has received a contract from the Youngstown Sheet & Tube Company for seven 100-ton steel ladles, with pouring manipulators complete. It is believed that these are the largest open-hearth steel ladles ever contracted for, the largest in use at present being of 80 tons capacity. The same company has been given a contract for six stacks, 7 ft. 9 in. in diameter by 160 ft. high, one for each of the Youngstown Sheet & Tube Company's new open-hearth furnaces, and also for five stacks, 5 ft. 6 in. in diameter by 95 ft. high, for the pit furnaces.

The W. J. Rainey Coke Company, which has 3000 coke ovens in the Connellsville region, of which 2200 are in blast, expects to start up the other 800 ovens within the next two weeks. It has taken some heavy contracts for furnace coke for delivery over the first half and some through all of this year, one being for the entire supply for the three blast furnaces of the Youngstown Sheet & Tube Company.

The M'Auley Automatic Steam Trap Company, Pittsburgh, has received a contract for the steam trap equipment of the American Sheet & Tin Plate Company's plant at Chester, W. Va. Other orders received are from the Pittsburgh Pipe & Equipment Company, Cambria Steel Company, Louisville & Nashville Railroad shops at Louisville, Carnegie Steel Company's works at Homestead and Mingo Junction, West Virginia Pulp & Paper Company, Piedmont, W. Va.; Richardson Paper Company, Lockland, Ohio; Pennsylvania Railroad Company's shops at Pitcairn, Pa., and at Logansport, Ind.

The West Penn Steel Company, Brackenridge, Pa., is letting contracts this week for three additional hot mills. The Ft. Pitt Bridge Works has been given the contract for the mill building extension, 80 x 436 ft. This extension will contain the three new sheet mills and 12 stands of cold rolls, as the company is going more strongly into cold-rolled material. There will also be erected a separate building for loading, with two 15-ton cranes, and the bar mill runway will be extended 150 ft. The additional sheet mills will be sufficient to take up the company's surplus steel, so that it will not ordinarily be a seller of sheet bars.

The H. C. Frick Coke Company has started about 1600 more coke ovens in the Connellsville region, and expects to start additional ovens in the near future.

The report that the Carnegie Steel Company will erect a large car wheel works on ground adjacent to the Edgar Thomson rail mills at Bessemer, Pa., is untrue. For a long time the company has had an appropriation to purchase ground in that vicinity, which is being taken over as fast as offered on favorable terms. This gives rise to the report.

The Watertown Arsenal Labor Trouble

Peculiarities of the Efficiency System as Tried There —The Investigation by a Congressional Committee

BY MAX H. C. BROMBACHER*

Reports from Watertown, Mass., and vicinage, having their origin in sources more or less semi-official, have intimated for some time that a fine showing was being made at the United States Arsenal there, whether viewed from the standpoint of reduced cost of manufacture, increased wage of operatives, progress attained in respect of process of installation or general satisfaction of the operatives with the system and the manner of its application. On the other hand, reports having their origin in sources closer to the operatives have been of almost diametrically opposite tenor; have, as a matter of fact, voiced the opinion that the operatives were very much dissatisfied with and opposed to the workings of some of the basic details of the system, and that the alleged reduction in cost of manufacture was, all things considered, much more seeming than real. These latter reports indicated that some of the details of the system had met with the hearty cooperation of the operatives; hence it seemed as though their dissatisfaction was not of the indiscriminate kind usual in somewhat similar cases.

Be this as it may, the sudden walk out of the molders at the arsenal last August was a concrete demonstration of the absence there of that state of mind which is generally considered to be a condition precedent to the dove of peace spreading its wings over a given state of affairs and resting in peaceful content. On the contrary, this sudden walk out, followed by the equally sudden return to work of the molders, presaged to the writer action ending or likely to end in a Congressional investigation; and, as a matter of fact, it eventuated in the resolution below being adopted by the House of Representatives August 21:

A Congressional Investigation Ordered

Whereas, The United States Government has been experimenting with and has partially installed at United States arsenals and navy yards a system of shop management known as the Taylor system; and

Whereas, It is charged that this system is detrimental to the best interests of the Government service and to the workmen employed; and

Whereas, This system has been in partial operation for a considerable time, it is desirable to know what the results of its installation have been, and especially whether it should be installed in Government works; therefore be it

Resolved, That a committee of three be appointed by the Speaker of the House for the investigation of the Taylor and other systems of shop management, which shall include its [or their] effects on wages and labor costs, and such other matters connected therewith as may give a thorough understanding of the results of the installation of this [or other] system.

The resolution carried the usual authority to sit in the pending recess, to send for persons and papers, and to engage the requisite stenographic and clerical help, and directed the committee to report by December 10, 1911. The time to report has been extended until March 10.

This committee consists of two Democrats, William B. Wilson and William C. Redfield, and one Republican, John Q. Tilson. Mr. Wilson represents the Blossburg district of Pennsylvania, is chairman of this special committee and is also chairman of the House Committee on Labor. Mr. Redfield represents the Flatbush district of Brooklyn, N. Y., and Mr. Tilson represents the New Haven district of Connecticut. As regards their respective vocations Mr. Wilson is a coal miner, Mr. Redfield is a manufacturer, and Mr. Tilson is a lawyer.

Mr. Wilson is a labor unionist, but as indicating his regard for non-union public opinion (which, by the way, is not often in evidence by unionists), it gives one pleasure to digress for a moment and relate a bit of history in regard to the formation of this committee. The resolution, as originally drawn, provided that the investigation should be intrusted to a sub-committee of the Committee on Labor. On the surface this would seem to be quite proper, but Representative Mann of Illinois fought it vigorously. Mr. Mann's impelling motive in taking this action was far less clear to Mr. Wilson than was the vigor with which he fought. Mutual friends seeking the cause of Mr. Mann's opposition learned that it was due to the fact that there were four labor unionists on the Committee of Labor, and that the resolution would permit of their constituting the entire special committee. To Mr. Mann's mind the report of such a committee on such a subject would be discredited in advance in the eyes of the non-union public; hence its work would be a waste of time and money. Mr. Wilson at once recognized the force and fairness of Mr. Mann's objection to the resolution as it stood, and, though the committee would not have been monopolized by labor unionists, he at once agreed to the resolution in the form in which it passed.

The Attitude of the Committee Members

All three of the members of the committee are above the average in respect of ability; and, though it becomes apparent to an interested listener that Mr. Wilson's questions at the hearings indicate a slant toward the opponents of the system under investigation, it becomes equally evident that the question of Mr. Redfield indicate a slant toward the proponents of efficiency systems. Mr. Tilson's questions indicate a desire and intention to elicit salient facts from both sides with a slant toward emphasizing the humane in addition to the human equations in the case. And when the listener learns the vocations of the different members of the committee he naturally has to admit that they are all acting naturally and in line with what their vocations would intuitively lay down as the proper line of investigation on the subject under investigation.

Upon reflection the outsider of an unbiased turn of mind is forced to admit that the make up of the committee, taking into consideration the work which lies before it, is almost ideal. It would really be difficult to find three men whose vocations, whose attainments in those vocations and whose dispositions would better qualify them for the work in hand. Mr. Wilson knows by bitter experience the hardships and injustice to which some ignorant and brutal employers have subjected their operatives, and he also knows that, in most cases, this course of treatment affected the employer's best interests unfavorably, the dense economic ignorance of the employer, however, precluding the latter's seeing it. Remembering these antecedent facts, one is not or should not be, surprised at noting that Mr. Wilson's line of questions seems to indicate a deeply grounded suspicion of any piece work or premium system which hangs out possibilities of largely increased earnings for workmen. His experience has taught him that these are too often only bait for the unwary and trustful operative; that they are schemes for the operative's undoing later, etc. His questions, therefore, have been largely directed toward showing the transitory nature of such increases in wages, where such are shown, and to demonstrate the innate tendency of employers to backslide from the altitudes of high grade industrial economics, even where they have, under efficiency guidance, attained these altitudes. He is, nevertheless, open to being shown and the writer hopes to be able to show him at least one employer sufficiently intelligent and firm in the faith to have refrained for years from backsliding, *i. e.*, from cutting piece work rates and thus proving his innate love for the "flat rate" when he (the employer) makes that rate.

Mr. Redfield, on the other hand, being a manufacturer, is naturally optimistic as regards the probability of his kind, once being educated to the delights in the shape of increased profits for themselves and increased wages for their men, which are the results of high grade industrial economics, remaining fast in the faith. It follows that his line of questioning is largely directed to showing the growth of real intelligence among his kind and the probability of its increasing with time, which is an absolute condition precedent to both the comprehension and the

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practice of the high grade industrial economics which theoretically underlie all efficiency systems and which require to be fully comprehended, including "the why" if backsliding is to be a thing of the past. Simple justice to Mr. Redfield requires the statement that he is unsparing in condemnation of that particular form of genus asinus embodied and typified by the manufacturer who cuts piece work rates except as the result of increased equipment or more modern equipment. And it goes without saying that his experience as a manufacturer has been of great benefit to the committee.

Mr. Tilson, being a lawyer, one naturally expects, or likes to expect, an exhibition of the judicial temperament. It gives the writer the greatest pleasure to say that Mr. Tilson meets that expectation fully. His line of questions tends to shed light on the spots left dark on both sides, inadvertently, by the questions of Mr. Wilson and Mr. Redfield. He seems invariably to insist upon eliciting the fact, sometimes overlooked by some efficiency engineers, that there is a human equation which must be considered in attempting to introduce any system of shop management where men, not machines, are necessary to get out the work. But it pleased the writer mightily to find him going further and insisting upon connecting up with the human equation the humane equation in any system hoping to be accepted by operatives and the general public. This is a foundation truth, as a matter of fact; but its perception is of very recent growth, and the growth of the perception leaves much to be desired in respect of rapidity.

It will be fairly evident from this analysis of the committee, their personnel, vocations and dispositions, that they are all fair men besides being able men; hence that a unanimous report from them on the subjects under investigation may be hoped for with confidence. It needs no additional words to impel a universal recognition of what a unanimous report from this committee would mean to the industrial world.

The Committee Has a Wide Range

As regards authority and scope, a glance will show that the committee has a wide field to delve in, if it cares to do so. This is embraced in the two words "other systems" of shop management, and it shows that the inquiry is not limited to Government arsenals and navy yards nor to private establishments. As a matter of fact, the committee has already touched upon an outside shop, the Yale & Towne Mfg. Company's, and has asked a large number of questions about railroads. It is therefore not beyond the possibilities nor the probabilities that it will look into the question of shop management in one or two railroad instances. It is understood that an element among the labor organizations is desirous of presenting for the consideration of the committee some testimony in regard to the opinion held by its members regarding the scientific management system in vogue on the Santa Fe. In view of antecedent circumstances connected with the rate hearings last winter, this would open up a field the exploration of which would certainly prove interesting to the railroad world.

Who among railroad men, or outsiders for that matter, has forgotten the merry war which was being waged last fall around the question of the applicability or the non-applicability of scientific management to railroads and to their shops, pending and after the hearing before the Interstate Commerce Commission in the rate increase cases? The proponents led by Mr. Brandeis made large claims in respect of potential economies which would result therefrom, and, as has been said, offered quite a lot of evidence as to the successful working of the Taylor system in large private works, such as those of the Tabor Mfg. Company, Link-Belt Company and Yale & Towne Mfg. Company. But it was remarked upon that, although he put the engineer on the stand who had installed a modification of the Taylor system on the Santa Fe, he did not avail himself of the obvious opportunity to offer evidence about scientific management in a railroad proceeding by an engineer who had applied it on a railroad; obviously, this line of evidence would have been much more relevant than any quantity of evidence as to the workability of scientific management in any number of private concerns offered as having a potential bearing on its applicability to railroads and their shops.

The omission of Mr. Brandeis to go into the Santa Fe case was the more regretted on account of the magnificent results claimed by railroad periodicals to have been achieved there, and which had given the Santa Fe betterment work world-wide celebrity. And the interest was heightened by the attitude of the Santa Fe officials toward this particular form of scientific management. They were understood to deny more or less flatly that the results of the installation came within gunshot of being a success; and yet figures had been published purporting to be accurate statements of the results of the installation of the system. Now the engineers who got those figures in the course of their investigation certainly did not go down there as accountants or auditors; and, just as certainly, they did not evolve them out of their inner consciousness. Yet, if these figures were accurate, the installation was a success, denials to the contrary notwithstanding; and if the figures are not genuine, who furnished them is a question which demands an answer. If the committee solves this enigma it will have performed a public service of large value to the industrial world.

The Hearings

The seven hearings at Boston, October 4 to 11 inclusive, were taken up exclusively with the matter of the arsenal at Watertown; and one or more trips have been made and some testimony taken right at the arsenal. There have been hearings held in New York City also, commencing October 25 and ending October 27. Nearly 1100 pages of testimony was taken in the matter of the Watertown Arsenal, and about one-third that much at the hearings in New York City. The subject matter in the latter hearings, however, mostly covered different systems of efficiency, there being, practically speaking, but one concrete case covered, that of the Yale & Towne Mfg. Company, although some testimony in regard to the Brooklyn Navy Yard was allowed to be offered by workmen from there.

The case at the arsenal permitted of conducting an investigation radically different from the general run of Congressional investigations. The complainants knew or could have found out what they wanted to prove; how many instances they could offer evidence on; who their witnesses were and, inferentially, what records they needed. And in like manner, the defendants (the officials) should or could have known what they had to meet and what witnesses and records they needed for their purpose. With this material, the case could have been outlined, the witnesses put on in each case until that particular instance had been developed to its sequence; cross examination on both sides had, while the witness was fresh, etc.

At the beginning, the officials (military men) did not cross examine the witnesses after their direct examination had closed, which was hardly fair to the witnesses affected. It required them to return for cross examination; it made necessary a loss of a day's wages or that their organizations would have to be at that expense. And the hit-and-miss character or manner in which the labor organizations put in their evidence is accounted for, to some extent, by the fact that there were three organizations represented: one, the International Molders' Union, another the International Machinists' Union, and a third which called itself some kind of a league. It seemed to be, possibly, a case of too many leaders for the regular organizations to provide offices with, hence the obvious thing had been done, a new organization had been formed to provide offices for leaders.

Toward the end of the Boston hearings, something like order seemed to be in process of being evolved from chaos. The leaders, Messrs. O'Leary of the molders and Johnston of the machinists, took hold, and things commenced to look different at once. Fairness, however, requires the explanation that the failure to take this course before was not the fault of these gentlemen. They are both able and resourceful men, and no cause intrusted to them will be slighted if they can help it. But the American Federation of Labor had taken charge of matters at the beginning, had made the talks before Congress asking for the investigation, and the men naturally looked to them as long as they had assumed charge. As they did not appear at Boston, Mr. Johnston, president-elect of the Machinists' Union, butted in, and Mr. O'Leary and he did much to save the situation for the workmen.

With an investigation conducted in properly arranged, orderly and sequential manner as was seemingly possible, the public could have followed the report of the committee when made, and checked up its conclusions. This would have resulted in that most unusual thing—a Congressional investigation whose report would have been followed by the public reading the evidence on which its conclusions were based, and this refers, most especially, to the case at the arsenal, which really brought the matter to a head.

As it was, a given instance was seldom pursued to a conclusion before another instance was taken up. This was no one's fault in particular; both sides were sinners in this respect, only it affected the men more than it did the officials at the arsenal. But this makes it impossible, practically speaking, for the public to follow any one case out. It requires jumping back and forth in the reading of the testimony, and this is none too easy even for minds trained to digging out the salient facts from a mass of irrelevant and, in some cases, redundant rubbish. There was a wide latitude allowed witnesses in respect of their testimony, and this course was, under the circumstances, highly advisable; it would work practical injustice to hold the men down to legal evidence in such cases. And, as a matter of fact, quite a good deal of the testimony could be classed as coming under the head of "verifiable" as differentiated from "demonstrable."

As has been said, the importance of the Watertown Arsenal case lies in the fact that it has a distinct relation to and bearing upon the applicability of scientific management to railroad shops and the large number of industrial establishments closely analogous to such shops. And it is to be remembered that, while flatly denying its practical applicability to their shops or analogous ones, the railroad people freely concedes that it had its good points, such as are susceptible of practical applicability to their shops. They were unanimous in denying that Mr. Brandeis had made out a fair case of even inferential applicability, speaking practically, of the principles of scientific management to their shops by the evidence he adduced in favor of that system of shop management in the instances of the Tabor Mfg. Company, Link Belt Company and Yale & Towne Mfg. Company.

It is not purposed to detail here all the railroad objections cited. It is not even purposed to detail here all the differences in respect of lack of analogy. It is simply purposed to state that a very apparent lack of analogy, and withal decidedly important in their nature, is shown by the facts that the work of the various concerns cited by Mr. Brandeis is essentially exact duplication, and in very large quantities at that. Over against which we see no duplication in railroad and a very large number of other shops, and very small quantities, often only one piece of a kind at a time. It is true that railroad and other shops show similarity, but there are no two pieces exactly alike. This constitutes differences which are decidedly important in more ways than one. And the work at the arsenal is in just these two important respects analogous to railroad shops.

The Work at the Watertown Arsenal

The work at the Watertown Arsenal consists, mostly, of gun carriages and in small quantities at that. While similar, they differ in kind as well as size. Herein the work differs radically from that carried on in the plants of the Tabor Mfg. Company and other companies which Mr. Brandeis produced evidence to show had discovered that scientific management was a practical success. It goes without saying that, in shops where the line of work is principally exact duplication and in large quantities, the workmen become more or less integral parts of the machines which they operate even though they are not cast integral with the machines.

In the other cases, where no two pieces are exactly alike, the element of the individual judgment of the operative cuts a very large figure; and just to the extent that the personal equation is a factor does the rigid application of any shop system become a difficult if not an impossible matter, from a practical standpoint. Of course, anything can be done in theory. The Germans have a saying that "paper is patient"; meaning that any old thing can be done on a drafting board or in a book. Iron, steel and men are very different propositions from paper; hence, that a system working successfully in one kind of shop was not necessarily, even inferentially, applicable to other kinds of shops struck practical people at once.

Concerning the arsenals and navy yards, the military and naval officers who manage them are, from a practical manufacturing viewpoint, just about as theoretical as are the engineers usually employed by efficiency concerns in the installation and application of their systems of shop management. This fact emphasizes the fairness of arsenals and navy yards as criterions in regard to the applicability of scientific management in similar shops.

At the first hearing at Boston the matter from the operatives' standpoint was opened by J. R. O'Leary, in an address in which he outlined at some length the position of the molders in the matter. He voiced their principal objections to the system installed there as being the use of the stop watch and of the premium or bonus system. He objected to the use of the stop watch in general and to its use by non-practical men especially as being derogatory and humiliating to the operatives; and he objected to the bonus and premium system, as tending to increase output at the expense of quality of workmanship, especially, as having heretofore been invariably used as a means of exploiting the operatives, by inciting a large output and temporarily large increase in wages, followed invariably by requirement of increased output at previous wage earnings.

Mr. O'Leary on Piece-Work Systems

He stated that, barring the day work system or the straight piece work system, this had been the experience of a lifetime; and he astonished quite a number of his hearers by following this statement up with one to the effect that, in his line, a straight piece work system had been in operation with the consent of his organization with concerns controlling 90 per cent. of their line of work for the last 20 years, and was likely to continue, as it had uniformly shown satisfactory results to employer and employed. This naturally carries a varying scale of earnings as concerns the operatives in the shops concerned, and concedes the underlying variation in respect to abilities of all men, which the flat rate of organized labor seems to deny. But right here, though ahead of the chronological order in which the fact appears in the record, it will be well to state that the operatives at the arsenals and their representatives at the hearing freely conceded the advantages of several features of the scientific management system installed there, such as planning, routing, etc., and it will also be well to state ahead of the chronological order in which the fact appears on the record of testimony that the master mechanic of the arsenal, and later on one or more foremen, were members of the planning board.

Mr. O'Leary gave it as his judgment that the cost of the system might eat up the seeming profits, and that reduced costs of manufacturing were not the only nor the conclusive factors in a properly formed and accurate estimate on that point. He gave instances of the system having been used to exploit the operatives; questioned the ability of the average time study man to lay down a correct estimate of the time in which a given job should be performed by use of the stop watch, but admitted that it was perfectly practical for an experienced mechanic to do so. And he stated that the attempt of inexperienced people to do just this sort of thing, that is, set time and make prices for operatives to work by, had caused more strikes than anything he knew of. He gave it as his opinion that efficiency or premium systems were good things for second grade operatives, but that the premiums were often earned at the expense of good workmanship under the spur of the stop watch. He stated that the strike at the arsenal foundry was due to a clerk making time studies, and wound up by implying that the major portion of the men's dislike for the use of the stop watch was due to their knowledge of the fact that the class of people employed to use the stop watches had, as a general thing, very little if any practical knowledge of the work. The testimony or address under oath of Mr. O'Leary, along with the running fire of questions by the committee and answers by him, is spread over pages 2 to 39 of the first hearing.

It is obviously impossible to copy here all these questions and his answers. But the foregoing will give a fair general outline of Mr. O'Leary's line of thought and testimony; and bearing in mind the natural slant due to his

official position, and the fact that his suspicions in regard to the ulterior objective of all efficiency systems are born of his personal experience and observation, one can gather that he is, all things considered, more than ordinarily fair; as to his knowledge of his trade there can be no doubt.

The writer would much prefer, for obvious reasons, to quote the testimony verbatim or, as that is practically impossible, to at least quote the substance of each witness's testimony; but when one considers that the hearings at Boston are spread over 1063 pages of testimony, of about 26 lines per page, it becomes evident that the length prescribed for an article that will hold its reader's attention practically imposes limits not permitting more than a summary of the testimony of different groups of operatives and of the arsenal officials.

As regards grouping the operatives, so far as this case is concerned, it resolves itself into the molders and the machinists; and as regards the relative amount of space taken in testimony, the molders covered about 350 pages. Since the trouble at the arsenal originated in the molders' strike, it may be well to complete the story concerning this group of operatives, though the following of this plan entails jumps so far as the record day by day is concerned. For instance, immediately after Mr. O'Leary finished his address, a machinist, not a molder, took the stand and machinists occupied the attention of the committee until the beginning of the third day, at which time the molders resumed the stage and held it until the end of the fourth day. From that time on, the machinists held the stage.

As regards the arsenal officials, they were always the same except in respect of the foundry, when, at times, Major Wesson and Captain Horsfall's names were mentioned, the former of whom gave some testimony. Colonel Wheeler and Major Williams's duties cover all departments in a general way.

The Details of the Trouble

Aside from arsenal officials, molders Hendry, Hicking, Gatte, Hall, Goostray, Cooney, Lawson and Acting-Foreman Roach gave testimony. The substance of the foundry trouble appears to be that the time study man, Mr. Merrick, made a time study on molder Hendry on a bench molding job of a pommel for a saddle, and another molder held an ordinary watch at the making of a time study on this job, and it resulted in an apparent discrepany of about 20 minutes between the readings. In consequence of this the molders held a meeting that evening and resolved to walk out if the use of the stop watch by the time study man was persisted in. The time study man undertook to make a time study on molder Cooney shortly after this, and the molders walked out. They drew up and left with the arsenal officials a statement of the conclusion they had arrived at and the reasons therefor.

Molder Hendry had been taking about three-fourths of an hour to make this mold, and the time study made by Mr. Merrick seemingly showed that the mold could be made in 24 minutes; but for reasons apparently satisfactory to the arsenal officials it was decided that 12 molds per day of 8 hours was a fair day's work. After the molders went out, a molder, a new man, named Edgecombe, was put on this job and he got out the mold in about one-half that time; he got out as many as 30 molds per day, some of them in about ten minutes. Needless to say that, *prima facie*, this was a complete justification of time study man Merrick's figures of 24 minutes, but the molders alleged that Edgecombe's record was by no means made under normal conditions. Testimony was adduced to show that he did not finish his mold anywhere near as well as had been the custom heretofore as done by molder Hendry, and that the castings came out rough.

In a case later on of a gun lever mold, Edgecombe got out in eight hours a floor mold on which the record showed the average time required to be 32 hours. Here again the molders adduced testimony showing that his castings came out rough; that he had not nailed down his cope anything like as securely as had been the practice; that he had robbed other molders of sand which they had prepared and had monopolized the use of the crane unnecessarily to the detriment of other molders. In short, Edgecombe had been tacitly if not intentionally allowed unusual privileges in every way for the seeming purpose of making a record, and his immunity from normal rules extended to his cursing Major Wesson without being discharged on an occasion when the major was attempting to remonstrate with him on account of a complaint of a molder. In fact, testimony was taken showing that molder Hall was discharged for objecting to Edgecombe's robbing him of his sand, to prepare which took an hour or more of Hall's time. But this testimony was stricken out on account of being a matter of administration and therefore outside of the committee's province. That the arsenal authorities did not waive this point and go into this matter must remain occasion for regret on the part of the general public.

If true, and, as the record stands, it was not disputed, the inference which the molders drew as to the *sacrosanct* character of Edgecombe in the eyes of the arsenal officials can hardly be denied; and the obvious inference was that Edgecombe was to be allowed to do anything necessary to make an apparent record for fast work, and that interference with his abnormal practices meant the loss of the complainant's job.

It may be well to digress for a moment in order to consider to some extent the genesis of the trouble in the foundry, apart from the genesis of the trouble at the arsenal regarding the introduction of scientific management as a whole. There is plenty of room for differences of opinion among efficiency engineers as to the universal applicability or the limited applicability of scientific management to manufacturing establishments irrespective of certain well defined differences; but it seems axiomatic to the writer that a foundry has innate peculiarities, which, to any man of practical sense, carries the sign of "Look Out When the Bell Rings" as far as carrying out scientific management or any system capable of deluding the enthusiast into an attempt to apply it according to a fixed rule; in other words, capable of deluding the enthusiast or the doctrinaire into an attempt to exalt or deify the system itself above the limits prescribed by the practical application of the system.

Distrust of Molders for Inexperienced Taskmasters

No one can read the testimony of the molders without perceiving that they had, figuratively speaking, their tongues in their cheeks at the attempt of the arsenal authorities to have people without any experience in practical molding take time studies on and set conditions under which molding was to be carried on in that foundry. One illustration of this kind was when, in response to an order from Captain Horsfall, the foundry foreman told a molder to stop nailing down the cope on the job he was working at; naturally, the casting came out in bad shape, but, just as naturally, any one knowing the least bit about such matters would know that such points cannot be decided arbitrarily and that "it was loaded."

A practical friend of scientific management would know that there was but one way in which that or any other system of shop management could be introduced into that or any other foundry, namely, to pick out one of the good molders, one not only good as regards speed and workmanship, but one naturally intelligent and fair above the average of his craft in that shop. Get his confidence, show him that you understood his view point, that he was skeptical in respect to what non-practical people did to him, or told him, but that, on the other hand, he was responsive to demonstrations by practical people; then let him hold a stop watch, if, as seems from the officials' testimony, a stop watch is the alpha and omega of scientific management, on the slow molders and top his readings and conclusions off with a demonstration.

It should not be necessary to spell out the difference psychologically as well as practically on any mechanic, of this line of treatment as compared with the line attempted to be followed at the foundry at that arsenal on the molders. To the writer it seems as though the difference would be apparent to anyone other than an efficiency engineer indisposed to pay the salary which this kind of talent is worth; or, to an official whose education and training has been in a line which has necessarily ground into him the habit of yielding and exacting implicit and unquestioned obedience to orders as they read. This sort of training is hardly conducive to the understanding of other specimens of the genus humanus; and especially not of the genus mechanic, with the ingrained dislike of hard and fast rules taught him by the practice of his trade.

It was not impossible to find such a man among the molders at that arsenal, judging from the testimony given by some of them; it is not intended to imply that the molders were all angels, nor that there were not some among them who were of a truculent disposition, nor that they were not unanimously, from foreman to molder, opposed to the system; but it is intended to say that the evidence does show quite clearly to anyone who has had any practical dealings with mechanics, and who has the native or acquired ability to atmosphere a given situation from their viewpoint, that evidences of intelligence and fairness on the part of the molders crop out every little while. And the writer wishes to clinch this point by saying that, while he is not personally acquainted with the man, yet the evidence given by molder Cooney shows him to be head and shoulder above any of his fellow craftsmen who testified there; and, that the writer would not want a better molder as a means of introducing a system of shop management into any foundry with whose line of work Mr. Cooney was familiar.

Nor should it be overlooked that the rules and practices governing the rating of the men from a wage standpoint, in Government arsenals, are such as to make the introduction of the card which usually accompanies a time study a fearsome thing to a mechanic; this is due to the statement of the minimum time and the time limit, when made as a result of time studies made in the usual manner by usual people. This is due to the fact that he thinks he has got to meet minimum time or it will affect his semi-annual rating, upon which depends his day work rate for the next six months.

In the case of the foundry, it is to be remembered that the time studies were taken by a machinist at best, not by a molder; and that the knowledge of the officer in immediate charge of the foundry, Major Wesson, in regard to molding, was confined to a four months' course at the Watertown Arsenal foundry. And the reiterated statements under oath of all the officials that, in their opinion, a practical knowledge of molding was not necessary to make a fair time study about so intricate a thing as a mold, with all its ramifications, was hardly likely to infuse confidence or drive away the fear of the men on this score.

It would be comical, were it not so natural and under the circumstances so pathetic, to see the anxiety of the molders to respond to the kind of a concrete time study which a demonstration of ability to make a mold in a given time makes to a molder or any mechanic. Every man of them was spurred to greater output by the showing that molder Edgecombe made; and the evidence seems to show that they met his records, due regard being had to the time which the operations of Edgecombe cut out and his monopolizing of foundry facilities accounted for. For instance, in the case of the gun lever, where the average time, as per former records, was 32 hours, and where Edgecombe reduced this to eight hours, but where the testimony seemed to show that he had stolen sand, held on the crane, failed to nail down the cope properly, etc., accounted for some of the saving, another molder got his time down to 14 hours. One and all in the foundry seemed to take as a matter of course that it was their duty to equal anyone's output under given conditions.

The Arsenal Officials

The testimony of the arsenal officials is decidedly interesting to an outsider on account of its directness in some ways and its lack of directness or perception of relevancies in other ways. For instance, they showed not the slightest indisposition to acknowledge their belief that it was not necessary to have a practical molder take a time study on a molding job; on the contrary, they seemed to think that a non-molder would be able to do better than a molder on account of a broader horizon, etc.; but it is needless to say that, apart from this discussion, the average manufacturer would hardly subscribe to this doctrine to be applied in his factory; he might be willing to see it tried in some other shop.

On the other hand, their evidence seemed to show that they thought nothing of the value of a demonstration as compared with a time study; inferentially, that if a time study showed it took more time to do a given job than the job was done in, and correctly at that, they would disregard the demonstration time. It is a safe guess that the report of the committee, when it comes out, will not indorse the correctness of this line of thought, at least so far as concerns mechanics as they are at present.

And one more potent influence in shaking the faith of the men in the system as applied there is apparent to any one with knowledge of men. Reference is here had to the iteration and reiteration of the arsenal officials of the statement that "they reserved the right to make time studies and to change time limits until they were sure that their time study was right." It goes without saying that, to the men, this meant everlasting uncertainty, with the certainty of a downward tendency prevailing.

No Reflection on F. W. Taylor

So far as the trouble in the foundry is concerned, justice to F. W. Taylor seems to require the statement that there is nothing which shows that he is fairly chargeable with it, and this also seems to apply to his writings. In his writings, Mr. Taylor seems to emphasize as installers or appliers of his system the value of those "who can show" the operatives, as differentiated from those "who can tell" operatives how to increase their output; and in none of his writings has the writer ever seen a word advising the employment of non-molders for the purpose of taking time studies in foundries on molders.

In the case of the trouble in the machine shops at the arsenal, some distinctly Taylor features appear, such as his cutting tools and his so-called countershafts, which are designed to increase the output of the machine tools to which they are applied; considerable testimony was taken in reference to the practical working of these features. It is idle to deny that the trouble in the foundry may accentuate the skepticism of those who are skeptics in respect of the practicability of scientific management, broadly speaking. But it is just as evident to the writer that, had the cases on both sides been properly prepared, had the evidence and records relating to each instance under observation been at hand on time, and had each instance been followed to its sequence without distracting interruption, the public would have been in position to read the evidence, follow each case clearly, and thus be in position to apportion, justly, the blame as between the system and the attempted application thereof.

At the same time, nothing herein is intended to imply personal criticism of Colonel Wheeler or any of his military subordinates in charge, under him, of the different departments at the Watertown Arsenal. They are doubtless fine soldiers and fine men, as is the case as a rule with both military and naval officers in this country. But, in the opinion of the writer, their qualifications as such fine officers carry natural or acquired traits which totally unfit them for the conduct of manufacturing. To use a French expression, they have, as manufacturers, the defects of their good qualities as officers. They are accustomed to yield and to exact instant and implicit obedience. This works all right with soldiers, whose training fits them for this frame of mind. But a mechanic is a diametrically different proposition. The better mechanic he is, the greater is his individuality and his cultivation thereof; hence the greater is his inability in fact to work under military principles as a mechanic.

The walkout at the Norfolk Navy Yard a short time since senses, to any one accustomed to handling mechanics, the seeming inability of officers to comprehend that mechanics cannot be treated like soldiers or sailors. In that case, the mechanics are alleged to have had a new system sprung on them without a moment's warning or a word of explanation. A practical handler of mechanics would have called in a few of the men's leaders, explained the whole thing to them, advised them that the new system was the result of orders from "higher up," etc., and the chances are that there would have been no trouble.

A mechanic usually feels toward a military officer, so far as manufacturing goes, like a horse toward a green driver or a housemaid toward a green mistress. All three know that their alleged superiors don't know the business they are attempting to conduct; hence lack of respect and resultant insubordination will follow.

The Wheeling Steel & Iron Company, Wheeling, W. Va., has recently completed the relining of its blast furnace and the building of two lines of coke and ore bins.

The Connellsville Coke Trade in 1911

The Connellsville coke trade of 1911, says the Connellsville Courier, was in keeping with the iron and steel trade, and was in precise figures as compared with the previous year 13 per cent. less as to production but 28 per cent. less as to the value of the product. The downward movement begun in 1910 continued until last summer, since which time there has been an upward movement, not very pronounced but quite visible. The net results of the year are 16,334,174 net tons of coke shipped out of the region, which, at the estimated average price of merchant coke, would mean a net value on the output of $28,000,000. Compared with previous years this is a ruinous loss in values. In 1906 the output was a trifle under 20,000,000 tons, but it represented a value of $55,000,000, and the succeeding year witnessed the output of 19,000,000 tons valued at over $55,000,000. The output of 1911, therefore, while almost as great as that of the best years in the Connellsville coke business, was sold practically at half price. The situation calls for serious thought and quiet endeavor.

The following tabulated statement gives a comprehensive view of the coke trade for the past 20 years. It shows the aggregate number of ovens in commission at the close of each year, the annual output and the average price, as compiled from 1880 and published annually by the Courier.

Year	Total ovens	Net tons shipped	Average price
1892	17,256	6,329,452	$1.83
1893	17,513	4,805,623	1.49
1894	17,834	5,454,451	1.00
1895	17,947	8,244,438	1.23
1896	18,351	5,411,602	1.90
1897	18,628	6,915,052	1.65
1898	18,643	8,460,112	1.55
1899	19,689	10,129,764	2.00
1900	20,954	10,166,234	2.70
1901	21,575	12,609,949	1.95
1902	26,329	14,138,740	2.37
1903	28,092	13,345,230	3.00
1904	29,119	12,427,468	1.75
1905	30,842	17,896,526	2.26
1906	34,059	19,999,326	2.75
1907	35,697	19,029,058	2.90
1908	37,842	10,700,022	1.80
1909	39,158	17,785,832	2.00
1910	39,137	18,689,722	2.10
1911	38,904	16,334,174	1.72

The average price of spot coke per net ton at oven, compiled from the weekly reports of the Courier, has been as follows in the past three years:

	Furnace coke			Foundry coke		
	1909.	1910.	1911.	1909	1910.	1911.
January	$1.70	$2.60	$1.40	$2.10	$3.05	$2.00
February	1.65	2.25	1.47	2.00	2.75	2.10
March	1.55	2.00	1.57	2.00	2.60	2.15
April	1.43	1.80	1.58	1.90	2.40	2.10
May	1.45	1.70	1.50	1.85	2.25	2.00
June	1.50	1.65	1.45	1.85	2.20	1.95
July	1.55	1.65	1.45	1.85	2.15	1.90
August	1.75	1.65	1.53	2.00	2.15	1.90
September	2.30	1.60	1.50	2.50	2.15	1.85
October	2.80	1.55	1.50	2.75	2.10	1.85
November	2.85	1.45	1.50	3.00	2.00	1.90
December	2.85	1.50	1.68	3.10	2.00	1.95
Year	$1.95	$1.78	$1.51	$2.24	$2.32	$1.97

Battleship and Armor Plate Bids

Bids for the construction of the two 27,000-ton battleships Oklahoma and Nevada were opened January 4. The lowest were from the New York Shipbuilding Company, Camden, N. J., at $5,926,000 for one ship, and the Fore River Shipbuilding Company, Quincy, Mass., at $5,935,000 for one ship. Only one other bid was received, that of the Newport News Shipbuilding & Drydock Company, which was $6,450,000, exceeding the maximum set by Congress by almost $500,000. The Cramp Ship & Engine Building Company refused to bid, on the ground that its entire plant would have to go on an eight-hour day basis if it took a contract. The Fore River Company's bid was for a vessel with turbine engines. For reciprocating engines, desired by the department, the bid was $5,980,000.

The new vessels will carry the most powerful main batteries afloat. Four turrets will house 10 14-in. rifles. The main armor belts will be 14 in. thick. They are to have a speed of about 20½ knots an hour, and will use oil for fuel.

Practically identical bids for supplying armor were tendered by the Bethlehem, Carnegie and Midvale companies, which each bid $420 a ton for 13,104 tons of Class A armor, or $480 per ton for 1,674 tons. For Class B armor, amounting to 445 tons, there was a slight difference in the bidding, the Carnegie Company's bid being $460 a ton, and the Midvale and Bethlehem $470. For bolts and armor attachments, aggregating 130 tons, all three companies bid $508 per ton.

President Farrell on the Outlook

In a statement given out at Pittsburgh, January 6, James A. Farrell, president of the United States Steel Corporation, said:

Business conditions continue promising and we are looking forward to a full operation in the steel industry for several months to come. The exports of steel products by the United States Steel Corporation during 1911 were, approximately, 2,000,000 tons, of which 1,500,000 tons was produced in Pittsburgh.

Our Pittsburgh plants are a great industry, in which the corporation takes a justifiable pride, and the fact that the increase in capacity of the Carnegie Steel Company alone in the last ten years is equal to the total capacity of the great Gary works is sufficient proof that Pittsburgh continues an important iron and steel-producing district.

The existence of the United States Steel Corporation we believe to be largely accountable for the fact that wages in the industry have been generally maintained through the period of depression from which we are gradually emerging.

The Boiler Manufacturers' Convention

The twenty-fourth annual convention of the American Boiler Manufacturers' Association, together with its associate members and the Supplymen's Association, will be held in New Orleans, La., March 12, 13, 14 and 15. Some very important papers will be presented and business will be transacted of great interest to all the boiler manufacturers in the United States and Canada and the supply houses dealing with the boiler and tank industry. An extensive programme of entertainment has been arranged and a large attendance of boiler manufacturers and supplymen from the United States and Canada is expected. Information relative to rates, hotel accommodations, etc., can be secured from F. B. Slocum, secretary Supplymen's Association of the American Boiler Manufacturers' Association, care of the Continental Iron Works, Brooklyn, N. Y.

The Steel Corporation Profit Sharing

Announcement was made January 8 that the subscriptions of employees of the United States Steel Corporation subsidiaries to its stock under the profit-sharing plan, in operation in the past nine years, would be received this year at 110 for the preferred and at 65 for the common stock. The closing price of the preferred stock on the day of the announcement was 111 and that of the common 67½. The subscription prices last year were 114 and 70, respectively. A circular has been issued giving details of the plan. Employees receiving $1100 or less a year may subscribe for one share of the preferred, while the maximum which any employee may take is 15 shares. Of the common stock, employees earning under $500 are limited to one share, with a maximum of 25 shares for the highest salaried officers. At the end of five years a cash payment of $5 a share per year is made to the holder of preferred stock and $3 a share per year to the holder of common stock, provided he has been continuously in the employ of the company through that period.

Annual Meeting of Rogers, Brown & Co.—The annual meeting of the firm of Rogers, Brown & Co. was held in Buffalo, N. Y., on Friday and Saturday of last week, at the home of the senior partner, William A. Rogers. Reports of the business for the past year were reviewed and plans for the coming year were discussed. The meeting was attended by all of the partners, representing New York, Chicago, Cincinnati and Buffalo.

The Machinery Markets

Conditions in the machinery trade throughout the country are practically unchanged. Confidence that greater activity will prevail within a few weeks continues firm and already there is an increased number of inquiries before the trade. New York dealers have received no big orders, but have had a fair share of small business and are busy with prospects. New England's machinery trade is on the mend. In Philadelphia there has been buying of single tools, with conditions quiet. Cleveland has had small buying but many inquiries. Similar conditions are found in Cincinnati as to domestic business, while the export trade is reported as good. Detroit notes a good business in electrical equipment, with considerable inquiry for special machinery. An increased number of inquiries is coming to the St. Louis trade and in the South power machinery continues called for. Demands for irrigating machinery are the feature in Texas, from which State is reported an improvement in Mexican conditions. There has been a good demand for wood working machinery on the Pacific coast, but the call for mining machinery has been disappointing in point of volume.

New York

NEW YORK, January 10, 1912.

The week in the New York machinery market has seen a great deal of activity, mostly of the sort that will be productive at a later date. Manufacturers and dealers are busy figuring on requirements of the Delaware & Hudson Company for its Watervliet shops, printed in *The Iron Age* last week. It probably will be several months before this list is entirely cleaned up. A number of new inquiries are in the hands of the trade, some of which call for special machinery or at least for machines which do not conform in one particular or another to standard designs. New York firms and representatives are working hard to get the business and the draftsmen of several firms are very busy. The Pennsylvania Railroad is buying machine tools, but is proceeding slowly and appears to have the greatest interest in tools of special design. Dealers continue to look for other Eastern railroad business in the near future. Some good business awaits the completion of shop buildings now in course of construction but concerning which information is meager.

The Department of Water Supply, Gas and Electricity of the city of New York is advertising for bids for furnishing and installing motor driven air compressors and appurtenances, complete, at the main and reserve high pressure fire service stations in the borough of Brooklyn. The time allowed for doing the work is 60 consecutive working days and the bids must be submitted to Commissioner Henry S. Thompson before 8 p. m. January 17. Bids should be made upon the blanks which are supplied for the purpose at the offices of the Department of Water Supply, Gas and Electricity, 21 Park Row.

The National Shear & Tool Company, Newark, N. J., recently organized to manufacture tools and shears under patents of George H. Powell, has secured a site at Avenue E and Harper street and has had plans prepared for a plant. The plans call for a building 50 x 110 ft., two stories and basement, of slow burning mill construction, the whole to be so constructed that it will stand as a main building of a plant which will consist of several structures, all to be erected within two years. A list of machinery and other working equipment is being prepared. Associated with Mr. Powell are J. C. Reese, W. F. Cook, E. L. Chase, all of Newark, and S. M. Amidon, of Wichita, Kan.

The Mead-Morrison Mfg. Company, 149 Broadway, New York, has closed a contract to supply to the Canada Cement Company three McCaslin conveyors. When the order is filled it will make 25 conveyors of that type used by the Canada company.

The Cox Brass Mfg. Company, Albany, N. Y., is building a three-story addition to its plant at North Pearl and Van Woert streets.

The Harding Mfg. Company, Cobleskill, N. Y., manufacturer of farming implements, is completing plans for a 90 x 200 ft. building for its plant to be erected next spring.

E. W. Edwards & Son, Rochester, N. Y., are having plans prepared for a light manufacturing and storage building and power plant to be erected on Main street.

The Buffalo Natural Gas Fuel Company, Buffalo, N. Y., has let contracts for the construction of a machine shop storehouse, stables and garage at Genesee, Monroe and Brown streets, to cost about $100,000.

The F. X. Muller Hose Company, Buffalo, has been incorporated with a capital stock of $100,000, to manufacture hose couplings and metal specialties of iron and other metals. The directors are Frank X. Muller, Joseph Bronold and Crescentia Hurley.

The Buffalo Metal Furniture Company, Buffalo, is building an addition to its plant at 1511-1513 Niagara street.

The Webster-Citizens Ice Company, Buffalo, is receiving bills for a refrigerator and ice storage plant, two stories, which it will erect from plans of the Starr Engineering Company, 50 Church street, New York.

The Electrolytic Products Company, Buffalo, is building a small addition to its plant at Elmwood and Hertel avenues, for the manufacture of radiators for automobiles and other electro-deposit products.

The Lombard Mfg. Company has been incorporated at Rochester, N. Y., with a capital stock of $30,000 to manufacture engine starters and other mechanical devices. The incorporators are J. C. Lombard, P. W. Hodgkinson and S. C. Ward.

The United Indurated Fiber Company, Lockport, N. Y., has broken ground for an addition 100 x 175 ft., which it will make to its plant.

The Fulton Machine & Vise Company, Lowville, N. Y., will build an addition to its foundry and a storehouse. The work is to be started early next spring.

The Empire Mobile Car Sign Company, New York, has completed plans for a factory building which it will erect on the Chemung River at Elmira, N. Y.

The Ames Iron Works Company, Oswego, N. Y., which recently increased its capital stock from $100,000 to $700,000, is arranging to add several new buildings to its plant.

The W. R. Case Cutlery Company, Bradford, Pa., has increased its capital stock from $60,000 to $250,000. It is understood that a portion of the increase is to be devoted to plant improvement.

Business Changes.

The firm of MacGovern, Archer & Co., 114 Liberty street, New York, has been dissolved by mutual consent, Frank MacGovern retiring from the partnership. J. Warren Archer will continue the business under the name of MacGovern, Archer & Co. until February 1, when it will be succeeded by the new partnership of Archer & Baldwin. G. M. Baldwin, who enters the firm, has been sales manager of the company for the last three years.

Philadelphia

PHILADELPHIA, PA., January 10, 1912.

The closing of a few miscellaneous orders for equipment, which have been under consideration for some time, is reported, but as a rule seasonable dullness prevails. While general inquiry has been rather light, several projects in connection with which a considerable quantity of tools will be required are in course of development and the trade expresses a more hopeful feeling as to the condition of business in the near future. Railroad buying is practically at a standstill.

While reports as to the past year's business are still largely unavailable, indications are that a number of manufacturers in this territory will show better returns than generally anticipated. The builders of standard types of machine tools have had a quiet year, but those building special equipment have done better; in fact, in a number of cases increases over the volume of business taken in 1910 have been reported. The local locomotive builder fell behind in 1911 as compared with the previous year. In instances builders of miscellaneous special machinery begin the new year with a satisfactory volume of business on their books,

sufficient to keep them actively engaged for months. In many cases tool makers are somewhat better off, as far as orders are concerned, than they were some months ago.

The demand for second-hand equipment has been quiet, both in machine tools as well as power equipment. A very fair amount of business in power equipment is in sight but develops rather slowly. Little improvement is reported in the foundry trade.

The Ottomobile Company, which will take over the manufacture and sale of the automobile line heretofore built by the Otto Gas Engine Works and sold through the Otto Sales Company, is in course of formation. Details have been completed for the transfer of the business to the new company, which will build both pleasure cars and trucks, a plant for which is to be located at Mt. Holly, N. J.

Day & Zimmerman, engineers, are taking proposals for the erection of the new plant to be built for the Hess-Bright Mfg. Company at Front street and Erie avenue. Plans call for a one-story steel frame saw tooth building, 180 x 202 ft., and a two-story building of slow burning mill construction 35 x 202 ft. The equipment has not yet come up for definite consideration.

The Brown Engineering Company, Reading, Pa., has under construction a one-story addition to its machine shop. The building will be of brick 40 x 48 ft. No additional equipment will be required.

The Baldwin Locomotive Works reports new business as being comparatively light. No large orders have recently been taken, business coming in being in the nature of single and small lots of engines. This company built in 1911 a total of 1606 locomotives, as compared with 1672 in the previous year. Both its local and Eddystone plants have recently been placed on an operative basis of four days a week. It has placed an order with the Pawling & Harnischfeger Company, Milwaukee, for the crane equipment for the addition to its Eddystone erecting shop. This order includes two 6-motor, 30-ton cranes with two 15-ton trolleys; two 8-motor 120-ton cranes with two 60-ton trolleys, each with a 10-ton auxiliary hoist, and four 6-motor 70-ton cranes, each with two 35-ton trolleys with 5-ton auxiliary hoists.

Mohn & Kershner, Reading, Pa., iron founders, are building a new foundry. The building will be 52 x 178 ft. Several other buildings are in course of erection and sand blast machinery, boilers, engines, etc., are being installed. A Whiting cupola and general foundry equipment have already been ordered.

The Blaisdell Paper Pencil Company has begun work on a one-story addition to its plant at Apsley and Wayne avenue. The building will be 60 x 200 ft. and outside of special machinery already provided for no machinery equipment will be required.

The Pennsylvania Railroad is having preliminary borings made for a new grain elevator which it proposes to build at Girard Point. The elevator, together with a grain dryer which is to be built adjoining the elevator, will have a capacity of 1,000,000 bushels of grain and will cost in the neighborhood of $1,000,000.

The Universal Screw Cutting Company has been incorporated, under Delaware laws, with a capital stock of $350,000. F. H. Gibbs is president; W. W. Gibbs, vice-president, and E. W. Crellin, general manager. The company has taken over the plant of the late Screw Cutting Company of America, at Seventeenth street and Sedgley avenue, the equipment of which will be overhauled and additions made, for the manufacture of lead and power screws.

The plant of James H. Mann, Lewiston, Pa., which was destroyed by fire several months ago, has been practically rebuilt and will be ready for occupancy in a few weeks. The business will hereafter be conducted under the name of the James H. Mann Company, for which a charter has been taken out, with a capital stock of $100,000.

The Link-Belt Company, Nicetown, reports business in 1911 as being quite satisfactory, showing an increase over 1910. This was particularly true of the first nine months of the year, a slight decline being noted in the closing months. Quite an improvement in inquiries is now reported.

The Spreckels Sugar Refining Company will begin work at an early date on a 10-story addition, with a two-story wing and a one-story frame storage shed, which are to be built at the corner of Dickenson and Swanson streets. The contract for the structural steel work in connection with the new buildings has already been placed.

The Milton Mfg. Company, Milton, Pa., has received increased specifications on contracts from car builders. December was better than the average for several months. The company's plant is being operated at 70 per cent. capacity.

The Frick Company, Waynesboro, Pa., has just completed a considerable addition to its plant, consisting of a two-story and basement building, equipped with a full line of machinery for the manufacture of ammonia valves and fittings. This department has grown rapidly, showing a gain of 50 to 100 per cent. over preceding years, and it became necessary to put in heavier equipment to take care of the increased business. During the past year sales of traction and portable engines, small stationary engines and boilers, threshers and saw mill machinery increased about 15 per cent. over the previous year. Its business in ice and refrigerating machinery, Corliss engines, return tubular boilers and tank work was about 50 per cent. ahead of the previous year. The largest proportion of the company's business is in its heavy lines.

The H. V. Lewis Company, 30 Church street, New York, has opened a Philadelphia office at 837 Real Estate Trust Building, under the management of S. A. Stephens. Through this office the Prentice Bros. Company, Worcester, Mass., maker of engine lathes, radial drills and drill presses, the Kempsmith Mfg. Company, Milwaukee, Wis., maker of milling machines, and the Newark Gear Cutting Machine Company, Newark, N. J., maker of gear cutters and shapers, will sell their line direct to the user instead of through a dealer as heretofore.

New England

BOSTON, MASS., January 9, 1912.

With the closing of the holiday season, proverbial for its dulness, the belief that business is on the mend continues to get converts, including some of the most conservative of manufacturers. Tangible proofs of at least a temporary improvement are multiplying. The question is whether the change is a permanent one or another of the transitory increases in volume of orders. The spottiness of the last year is well understood, but how great have been the rises and falls in individual experiences is not wholly comprehended. The case of a large manufacturer of machine tools is interesting. Assuming its 1910 output at 100 per cent. the year 1911 gave the following results: January, 51 per cent.; February, 82; March, 25; April, 135; May, 142; June, 76; July, 60; August, 63; September, 28; October, 69; November, 63, and December, 23. This is an exceptional case in the experience of the trade, as in most instances the year closed with a rising business, while others of these figures of the last 12 months show larger than the average. The usual opinion is that an improvement is about due, including a steadying of conditions to a more even output.

The drop forging business is experiencing some change. The automobile manufacturers are less dependent upon the commercial shops than they have been, owing to the creation of drop forging departments of their own. Some forging plants have operated practically exclusively for this trade and are now seeking other outlets for their products. Doubtless some of them will be impelled to establish machine shops of their own in supplying customers with finished or semi-finished parts instead of rough forgings.

Financially New England is in excellent condition to go ahead with largely increasing business. Manufacturers are better off in their resources than has been the case in the past after a long period of dull trade. The banks are prepared to accommodate business houses in a liberal manner, and various centers have created funds, or have this plan in view, in order to assist those young or growing industries which are worthy of more extended credits than the rules of the banks will warrant.

Eaton & Wilson, New London, Conn., ship supplies, will manufacture a new combustion engine silencer, designed by Charles H. Kenney. The device is an enlargement of a gun silencer, the invention of Mr. Kenney.

Winslow H. Robinson, 3 Prescott place, Worcester, Mass., manufacturer of tin, copper and sheet iron products, is contemplating enlarging his works by the erection of a building in the spring on land adjacent to his present factory.

The Standard Rubber & Cable Company, Bridgeport, Conn., has increased its capital stock from $50,000 to $250,000.

The Jacobson-Brandow Company, Pittsfield, Mass., manufacturer of spark coils and magnetos, has made an assignment to its treasurer, which action is understood to be a step toward reorganization, meaning the continuation of the business on a substantial basis.

H. L. Stevens has been appointed district sales agent of the Lackawanna Steel Company, with offices at 500 Marshall Building, Boston. He will have charge of sales in the New England district, formerly handled by J. W. Sederquist. The change went into effect January 1.

The water supply of New England has been replenished up to normal, possibly somewhat above normal for the season, the open weather of the early winter having been advantageous for the purpose. While most mills located on water powers now have auxiliary steam plants, water is coming to be a more important industrial element than ever before, because of the large hydro-electric developments, to which drought means serious results. New England manufacturing centers are receiving many thousands of horse power from these power stations, and a vast increase in this supply of electric energy is planned. The year will see a great amount of work accomplished towards this end, which is exceedingly important to inland plants, the power cost being much reduced.

The new building which the American Steel & Wire Company will erect at its works at New Haven, Conn., will be used for storage. It will be 60 x 60 ft., of brick and steel.

Additions to general manufacturing works which are projected include the following: Salt's Textile Mfg. Company, Bridgeport, Conn., one-story building, 100 x 165 ft.; John T. Slack Corporation, Springfield, Vt., textiles, one-story dye house; Whitney Mfg. Company, Worcester, Mass., stationery manufacturer, large factory at Barber's Crossing; West Boylston Mfg. Company, East Hampton, Mass., additional story to mill.

George M. Burnham, Springfield, Mass., building material, three-story brick factory, 50 x 65 ft.; L. F. Dettenborn Woodworking Company, Hartford, Conn., brick factory, 57 x 152 ft., two stories and basement; New Haven Rendering Company, New Haven, Conn., brick and concrete building, 50 x 100 ft., three or four stories; E. A. Mallory Company, Danbury, Conn., building, 42 x 172 ft.; Embalmers' Supply Company, Westport, Conn., one-story building, 45 x 100 ft., of terra cotta blocks.

Chicago

CHICAGO, ILL., January 9, 1912.

The Chicago Pump Company, Chicago, has found it necessary to seek larger quarters and its new location is at 906 to 910 West Lake street, Chicago.

James Rowe has had plans prepared for a two-story factory building to be erected at 1058 West Harrison street, Chicago, at a cost of $15,000.

Plans for the new Union Passenger Station, Chicago, are being prepared by D. H. Burnham & Co., architects, on the basis of an estimated cost of $3,000,000.

The H. A. Strauss Company, Chicago, has been organized with a capital stock of $2,500 to conduct a general contracting, engineering and building business. Incorporators are H. A. Strauss, William L. Strauss and E. S. Hartman.

The Imperial Belting Company, Chicago, has filed notice of an increase in its capital stock from $20,000 to $40,000.

The Simplex Railway Appliance Company, Chicago, has announced a change in its name to the Illinois Equipment Company.

Through B. A. Thorp & Co. the Stevens Estate, Chicago, has obtained a lease on property on Illinois street upon which a five-story factory building to cost $50,000 will be erected.

The Hygienic Ice Company has acquired property in Chicago upon which a new refrigerating plant 120 x 250 ft. will be erected. An expenditure of $300,000 is contemplated.

The Geo. W. Jackson & E. A. Clark Company, Chicago, has been incorporated with a capital stock of $10,000 to do general electrical engineering and construction work. The incorporators are Geo. W. Jackson, E. A. Clark and Robert B. Thorne.

The Betts Specialty Company, Chicago, has been organized with a capital stock of $1000 to manufacture and sell anti-creeper tie plates. The incorporators are F. A. Preston, Phillip W. Moore and R. N. Baylies.

The Illinois Oil & Gas Heating Company, White Hall, Ill., has been incorporated with a capital stock of $50,000 to manufacture and deal in burners, stoves and heaters. The incorporators are E. M. Prindle, E. S. White and Geo. W. Prindle.

The U. S. Ratchet Wrench Company, Peoria, Ill., has been incorporated with a capital stock of $20,000 to do a general manufacturing and distribution business by Geo. Rediger, Louis Rediger and E. W. Oliver.

The Gridley Sheet Metal Works, Gridley, Ill., has been incorporated by Geo. E. Wooddell, Roy C. Walker, E. M. Adams and H. S. Drum.

Morrison Bros., Dubuque, Iowa, is a new corporation with a capital stock of $50,000, organized by Andrew and A. L. Morrison and J. M. Southerland, to do a general manufacturing business in metals and machinery.

The National Mfg. & Supply Company, Minneapolis, Minn., maker of brass fixtures and plumbers' supplies, suffered a loss of $75,000 as the result of a fire in its plant.

The National Irrigation Water, Elevator & Power Company, Gary, Ind., has been incorporated with $50,000 capital stock to manufacture irrigation machinery. The directors are Cort Vaichis, Aristides Vaichis, Harry Arran and George Tamparys.

The Art Novelty Company, Elkhart, Ind., has increased its capital stock from $10,000 to $20,000.

The Indiana Village of Epileptics, Newcastle, Ind., through its Board of Trustees will receive bids for a laundry building to cost $17,500, a cold storage and ice manufacturing plant to cost $7,500 and a storehouse to cost $10,000.

The Pewpon Chemical Company, Philadelphia, has bought 10 acres of ground at Whiting, Ind., on which it will build factory buildings to cost $100,000. The industry was secured by the Whiting Commercial Club.

Cleveland

CLEVELAND, OHIO, January 9, 1912.

The new year has started out somewhat better than was expected by the Cleveland machine tool dealers. Although the first week in January is usually very dull a fair volume of single tool orders and some orders for lots of from three to five tools came out during the week. There is also a better volume of inquiry, which gives dealers a hopeful view of the situation. The demand for punches and shears is more active and makers of other lines of machinery are looking for a better volume of orders early in the year. Inquiries for heavy and special machinery and handling equipment are somewhat more plentiful.

The Globe Machine & Stamping Company, Cleveland, has commenced the erection of its main factory building on its new property on West Seventy-sixth street. The building will be 110 x 200 ft., two stories, and of brick and concrete construction. On part of the same property the company recently completed the erection of a sheet metal department 100 x 165 ft., one story. It expects to have its new factory building completed in June. This will double the capacity of the present plant.

The Warren City Tank & Boiler Company, Warren, Ohio, has completed an extensive addition to its main tank works, having erected an all-steel extension, 120 x 300 ft. The company has added considerable additional equipment to its hydraulic plant and is now in the market for a 25-ton crane.

The stockholders of the Maclean Foundry Company, Upper Sandusky, Ohio, have decided to issue $40,000 worth of preferred stock, the proceeds of which are to be used in the construction of a new plant.

The Morgan Glove Mfg. Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000 to take over the business of the late D. F. Morgan. J. L. Acker and others are interested in the new company. A new factory will be established at 717 South St. Clair street.

The United Cutlery Company, Canton, Ohio, has been incorporated with a capital stock of $25,000 by Claude Feightner, N. A. Sponseller and others.

The Toledo Sugar Company, Toledo, Ohio, has let a contract to the La Rue Construction Company, Detroit, Mich., for the erection of a large beet sugar plant at Rossford, Ohio, near Toledo.

The Goodyear Tire & Rubber Company, Akron, Ohio, will build an electric light plant. It will be equipped with a 1500 kw. generator and a 500 kw. motor generator set.

The Sharp Spark Plug Company, Cleveland, has increased its capital stock from $10,000 to $20,000. No extensions are contemplated.

The Hocking Electric Power Company, Nelsonville, Ohio, has been reorganized under the name of the Hocking Power Company with a capital stock of $50,000. It is stated that the present plant will be rebuilt and considerably enlarged. E. B. Young is president of the new company.

The Humphrey Pipe & Foundry Company, Bellefontaine, Ohio, has been incorporated with a capital stock of $10,000 by Charles S. Humphrey and others.

The United States Horse Shoe Company, Erie, Pa., is in the market for machine shop equipment.

The Kawneer Mfg. Company, Niles, Mich., has opened an office at 313 Garfield Building, Cleveland, in charge of A. B. Giett, who will look after the Ohio territory.

Cincinnati

CINCINNATI, OHIO, January 9, 1912.

Several machine tool builders, who have been able to figure up results of last year's business, state that if the present year turns out equally as well they will be fairly well satisfied. A great many of them believe that the next 12 months will be much better, notwithstanding the fact that this is a national election year. The total stock of machine tools on hand is undoubtedly larger than it was last year at this time, but both the railroads and the automobile manufacturers are expected to be much better customers in the near future. Then, too, the export trade is holding up remarkably well, and will probably show an increase in the early spring season.

The foundries are not very active, and a number of them are only operating to about 50 per cent. of capacity.

The Alvey-Ferguson Company has let contract to the Allyn Engineering Company, Cincinnati, for additions to its new plant at Oakley that will more than double its capacity. One of the proposed buildings will be 75 x 175 ft., three stories, and the other will almost duplicate the company's present plant, that is, 100 x 350 ft., one story; all of reinforced concrete construction. The company manufactures special conveying apparatus.

The Modern Machine Company, Cincinnati, whose incorporation has been previously noted, has leased the plant at Winton place, recently vacated by the Kern Machine Tool Company, which will be fitted up to build a special machine tool patented by G. K. Atkinson, president of the company. The company is in the market for several 16 to 22 in. lathes, one 30 x 30 in. x 12 ft. planer and 3 ft. radial drilling machine, new or second-hand.

The Superior Tool Company, Wheeling, W. Va., is a new incorporation with $50,000 capital stock. Nothing has yet been announced as to the company's manufacturing plans. Ed. W. Westwood and H. E. Rennard are named among the incorporators.

The Allyn Engineering Company, of which Harry Allyn is president, has moved its general offices from Oakley to a suite in the Second National Bank Building, Cincinnati. Among its latest contracts is one for an eight-story reinforced concrete building for Peter Smith & Sons, Detroit, Mich.

The Star Vulcanizer Mfg. Company, Columbus, Ohio, was recently incorporated to manufacture automobile specialties. Among the incorporators are David F. Detrick, W. L. Fox and N. J. Fountain, all of Columbus.

The Wildberg Box Company, Cincinnati, is moving its factory from Ninth and Eggleston streets to the old Tyler plant on Evans street, and will probably need special equipment, such as shafting, pulleys, hangers, etc.

The Industrial Club of Covington, Ky., gave a banquet on the evening of January 5 in its new clubhouse at Eighth street and Madison avenue. R. C. Stewart, president of the club and of the Stewart Iron Works Company, acted as toastmaster.

The H. & S. Auto Company, newly incorporated at Springfield, Ohio, will build an automobile garage with which will be connected a small repair shop. John W. Hennesy is named as one of the principal incorporators.

Frank A. Martin and J. R. Luckey, Cincinnati, have formed a parnership under the name of the United States Welding Company, and have established an oxy-acetylene welding plant at 217 West Second avenue. The Harris process will be used.

The Cincinnati Steel Casting Company has moved into its new foundry at Spring Grove and Queen City avenues, and drew its first heat last week. William Gilbert is president of the company and Fred. W. Lammers, secretary and manager.

As was recently mentioned an electric light and power plant will be constructed at Kimball, W. Va., and a company has just been incorporated with $50,000 capital stock under the name of the Kimball Light, Power & Water Company. The incorporators are Charles H. Warford, B. Burns, Charles H. Witte, Homer H. Miller and George Wright, all of Dayton, Ohio.

Hamilton

HAMILTON, OHIO, January 9, 1912.

Local machine tool interests report a fair volume of business. Orders for more than one or two tools are infrequent, and efforts are directed mainly toward improvement in facilities and maintenance of stock along standard lines in anticipation of future demands. The continued activity in the foreign market, combined with renewed domestic inquiry, particularly in the railway trade are the encouraging features of a situation otherwise unchanged.

Engine builders in Hamilton report general conditions as quiet. Considerable attention is now being devoted by the Hamilton manufacturers to the production of heavy gas engines. There is a feeling that this form of power will show a large growth in the immediate future.

The Republic Motor Car Company, Hamilton, is at present completing its new factory addition and expects to have the building ready for occupancy by February 1. Its new home will greatly increase this company's intended spring output. The plant is thoroughly modern and occupies a seven-acre tract.

D. O. Allen and associates of Fostoria, Ohio, who recently purchased the plant of the Columbia Carriage Company, have reorganized the business under the name of the New Columbia Carriage Company and have already resumed the operation of the company's extensive properties in this city. It reports a good outlook for business.

The new factory buildings of the Eagle Woodenware Mfg. Company are now completed and will be occupied and operated by February 1. This company is a development of the Eagle Cooperage Works of Circleville, Ohio, and F. M. Fritsch, proprietor of the Eagle Cooperage Works, is president and chief stockholder. The new Hamilton plant greatly increases the company's capacity and is one of the most modern woodenware establishments in America.

The Kern Machine Tool Company has completed the transfer of its business from Cincinnati to this city, and is occupying the plant formerly used by the Fireproof Furniture & Construction Company, which it has remodeled and improved. This company reports several foreign orders and an encouraging outlook for business.

The Reeves Rigling Egg Tester Company, recently organized in Hamilton, is arranging for larger quarters in this city, made necessary by the expansion of its trade.

Despite the general quiet conditions during the past year nine Hamilton manufacturing institutions substantially increased their facilities.

The George Automatic Roller Bearing Company, recently established in Hamilton, has practically completed the installation of its machinery and will be in a position to put its product on the market in the immediate future.

The South

LOUISVILLE, KY., January 9, 1912.

Although the fact that many plants have slackened operations on account of annual inventories being taken, thus diminishing the current demand for machinery, a good deal of business is nevertheless being closed and prospects are of the best. There is more activity in machine tools, while power machinery continues in excellent demand. The development of stone quarries and coal mines in Kentucky is giving rise to a good demand for special and general equipment.

The Louisville Hospital Commission, which opened bids January 4 on the construction and equipment of the new $1,000,000 municipal plant, decided after the bids had been examined to ask for others. This does not affect the bids on individual features of the equipment, but mainly refers to the construction work. New bids will be received until January 17.

The Hilles & Jones Company, Wilmington, Del., has installed some large motor-driven bending rolls in the Louisville plant of the Henry Vogt Machine Company. The rolls will handle plates 16 ft. long and ¾ in. thick.

The Abell Elevator Company, Louisville, is installing a high-speed electric elevator in the new building of H. J. Gutman & Co., Louisville.

The New Albany Mfg. Company, New Albany, Ind., opposite Louisville, reports a better feeling in the stone trade and a consequent improvement in the demand for equipment of that kind. J. N. Donnelly, Bedford, Ind., has purchased a crane, and the John Rowe Cut Stone Company, Bedford, has ordered several stone saws. A. F. Nye, a machinery dealer of Vancouver, B. C., has purchased a saw for a customer. An electrically operated traveler has been sold to the Victoria Limestone Company, Bowling Green, Ky., as well as gang saws and other equipment.

The American Machine Company, Louisville, manufacturer of elevators, reports excellent business and a fine outlook for 1912. Contracts for elevators recently closed include seven heavy-duty freight and two high-speed passenger elevators for the new building of the Southern Railway at Atlanta; a freight elevator for the Texas Company, Port Arthur, Tex., and a passenger elevator for the Hale's Springs Sanitarium, Rogersville, Tenn.

S. Weber & Sons, Louisville, who recently entered the second-hand machinery business, have opened quarters for this trade at 308 East Main street. Used wood-working machinery is to be made a feature of the business later on. The firm has heretofore dealt exclusively in scrap.

The Louisville Planing Mill & Hardwood Flooring Company is in the market for equipment for a power house, electric motors and a large amount of wood-working machinery for installation in its new plant, which is to be erected to take the place of that recently destroyed. Olaf Anderson is president of the company, which is located at Beech and Woodland avenues.

The city of Island, Ky., which is considering plans for the erection of an electric-light plant, intends to make arrangements with the Memphis Mining Company for the current.

The Clover Fork Coal Company, Barbourville, Ky., organized with $50,000 capital stock and headed by S. F. Whitfield, is to open mines in the Southeastern Kentucky coal district in the immediate future.

A Chicago syndicate is reported to have closed options on the lighting and gas plants of Hopkinsville, Bowling Green, Frankfort and Owensboro, Ky., and plans are being made for the improvement of the plants and putting them on a modern and efficient basis.

B. R. Dickerson, Paris, Ky., plans the opening of a machine shop there February 1. General machine work will be done, but automobile repairs will be specialized in.

The American Tobacco Company, it is reported, will erect a tobacco redrying house at Shelbyville, Ky.

The state of Tennessee is to let contracts shortly for the installation of heating and lighting plants in the western hospital for the insane at Bolivar, Tenn.

The Pratt-Cady Company, Hartford, Conn., manufacturer of valves and fire hydrants, has established a Nashville, Tenn., office with Fred S. Stewart in charge.

The Great Falls Power Company of Tennessee has secured the necessary permits from county authorities and is ready to proceed with the construction of its power dam across Caney Fork at Fall City, near McMinnville. H. M. Byllesby & Co., Chicago, are financing the company, it is stated.

Memphis, Tenn., is reported to be considering the installation of additional machinery in the water-works plant.

W. T. James, James Building, Chattanooga, Tenn., is interested in the erection of a steel plant of moderate capacity.

The Laxatan Chewing Gum Company, Chattanooga, Tenn., is equipping a factory for the manufacture of gum in Nashville, Tenn.

The development of the phosphate deposits in Tennessee is expected to be carried on actively in 1912. It is reported that the International Agricultural Corporation, which has options on land in Giles county, will begin the erection of large plant near Wales, Tenn., early in the spring.

The Morris-Harlan Stave Company, Trenton, Tenn., has purchased a large tract of white oak timber near Jackson, Tenn., and is considering the erection of a mill of good capacity at Jackson.

James Hand, Purvis, Miss., will erect a large sawmill near that point. Planing-mill equipment will also be installed.

The Pickard Buggy Company, Jackson, N. C., has been incorporated with $50,000 capital stock by E. H. Pickard and others and will erect a plant for the manufacture of buggies, surreys, etc.

C. E. Buck, Chattanooga, Tenn., and W. F. Stowers, Gadsden, Ala., have purchased some iron ore land near Gadsden and will expend $100,000 in equipping a mine for handling it. The plant will have a capacity of 1200 tons a day.

The Ivey Mfg. Company, Hickory, N. C., is asking for prices on a 90 h.p. Corliss engine. A used machine is preferred.

The American Pickle & Canning Company, Wiggins, Miss., is to build and equip a large cannery and will also install machinery for the manufacture of cans. Bids on the machinery will be opened January 15. P. H. Roberts is manager of the company.

Improvements are to be made in the gas plant of the Jackson Railway & Light Company, Jackson, Miss. The estimated cost is $2,500.

The Consolidated Furniture Works, Altavista, Va., has sent out inquiries for two 70 h.p. boilers. Second-hand equipment is desired.

J. W. Haas, Charlotte, N. C., has been given the contract for the erection of a pumping station for the municipal water plant. The contract amounts to about $20,000.

The Parkersburg Rig & Reel Company, Tulsa, Okla., has announced plans for an addition to its plant.

The Carolina Power & Light Company announces the completion of its hydro-electric power plant at Blewitt's Falls, N. C. The current is to be transmitted to Fayetteville, Jonesboro, Raleigh and other points.

The Farmers' Gin Compress and Cotton Company, Atlanta, Ga., has plans for the establishment of a plant for the manufacture of compresses for use in cotton gins. The company, which has a capital stock of $5,000,000, is headed by Harvey Jordan.

A $50,000 bond issue has been approved by the city of Lexington, Tenn., and the proceeds will be used for the erection of an electric light plant and a system of water-works. The bonds will be sold at once and plans drawn for the immediate construction of the utilities.

The John P. Dale Machinery Company, Nashville, Tenn., reports the sale of a large Erie City boiler to the Neuhoff Abattoir of that city.

The P. & C. Mfg. Company, Shelbyville, Ky., has been incorporated with $12,000 capital stock for the manufacture of instruments and medicines. George S. Chowning, W. S. Hackworth and others are the incorporators.

A. J. Croley & Son, Barbourville, Ky., have leased a boundary of coal land near that city to the Anchor Coal Company, which plans the immediate development of the property.

The Emerson Engine Company, Alexandria, Va., announces that it is considering rebuilding on a larger scale, and will possibly locate in another city. Victor L. Emerson is general manager of the company, which manufactures motor trucks and marine engines.

The Hartsough-Stuart Construction Company, Lake Charles, La., has been incorporated with $300,000 capital stock to manufacture ditching machinery. Walter H. Hartsough is president and Frank E. Jones secretary and treasurer of the company.

The Railway, Mill & Equipment Company has been organized at New Orleans, La., by Seeley Dunn and J. Otho Elmer, and has established offices in the Whitney-Central Building.

The Universal Nut & Bolt Lock Company, Newport, Ky., recently incorporated, has had plans prepared for a main building, 40 x 75 ft., three stories, of brick construction. The plant will be equipped with modern machinery for the manufacture of a patent nut lock and bolts. A department for case hardening small articles will also be added. George B. Martin is president of the company.

The Board of Aldermen, Johnson City, Tenn., will open bids February 1 for furnishing material, machinery and labor for building a gravity water supply, embracing approximately 12½ miles of cast-iron pipe and appurtenances.

The City Council of Union Springs, Ala., will receive bids until January 18 for the construction of a sanitary sewerage system and disposal plant complete. Willburn Hill, Attalla, Ala., is engineer in charge.

The Board of Commissioners of the town of Albermarle, N. C., will receive bids until January 16 for building a system of water-works. The specifications include a pumping station, two motor-driven turbine pumps, 750 gal. per minute capacity, switchboard, tower tank and about five miles of 10-in. pipe. Gilbert C. White, Charlotte, N. C., is the engineer in charge.

Detroit

DETROIT, MICH., January 9, 1912.

The opening week of 1912 has shown an encouraging aggregate of business in the machine tool market and it is difficult to find a pessimist among the machinery merchants. One sale of $4,000 of standard metal working tools is noted and figures for the week amount to a very respectable total. A very fair business in electrical equipment is in sight. Some good inquiries for special tools are reported and inquiry in general is showng no sign of falling off, but deals seem to close rather slowly. A moderate demand for second-hand machinery of various classes continues. A dearth of municipal undertakings of interest to the trade is noted and there seems to be little business of this nature in view.

Despite the great increases to the plants and equipment of the various sugar companies of Michigan noted during the past year, a number of the companies are planning still further increases to their capacity and builders of sugar-making machinery are optimistic over the outlook.

The foundry trade is holding up well both among the gray iron and steel castings plants and prospects for a good volume of business during the early spring are reported to be excellent.

The People's Ice Company and the Houghton-French Ice Company have perfected a merger of their interests and the operations of the consolidated companies will be enlarged. It is planned to erect two small artificial ice plants in the near future.

The Tivoli Brewing Company is enlarging its plant by the erection of extensive additions to its bottling and storage houses.

The Detroit Pressed Steel Company, manufacturer of heavy stampings and special tools, has increased its capital stock from $110,000 to $200,000. The company reports an excellent volume of business and has increased its equipment somewhat of late.

The Abbott Motor Company has increased its capital stock from $1,050,000 to $1,500,000.

A. T. O'Connor and John Utz are interested in the establishment of a factory for the manufacture of motor buses. It is stated that financial arrangements have been completed and that a site for the new plant is now under consideration.

The building occupied by the Chamberlain Metal Weather Strip Company was destroyed by fire January 4, causing a loss of $250,000. The company expects to resume operations in other quarters.

H. J. Mickham, Howell, Mich., is contemplating building a factory for the manufacture of a patent can opener.

The Duck Lake Power Company, Traverse City, Mich., recently incorporated, has secured franchises for lighting a number of villages in the vicinity of Cadillac, Mich., and will expend a considerable sum in improvements to its property.

The Port Huron Artificial Ice Company, Port Huron, Mich., has been incorporated with $30,000 capital stock by H. G. Barnum, H. C. Knill and J. F. Ruff. The company will erect and equip a three-story ice manufacturing plant.

The Star Brewing Company, Saginaw, Mich., has been incorporated with a capital stock of $65,000 by W. C. McKinney, William Mertz and John Racquet. The company takes over the plant formerly operated by Mr. Racquet.

The flooring plant of the Bliss & Van Auken Lumber Company, Saginaw, Mich., was destroyed by fire January 2, causing a loss of $15,000. The company will rebuild at once.

Lamont Bros., Bay City, Mich., are having plans prepared for the erection of a large wood-working mill.

Plans are under way looking toward the rebuilding of the large mill of the Escanaba Lumber Company, at Masonville, Mich., which was destroyed by fire recently. The company's headquarters are at Escanaba, Mich.

It is announced that the Durant-Dort Carriage Company, Flint, Mich., will add a department to its plant for the manufacture of motor delivery cars.

The Brooks Motor Wagon Company has been incorporated at Saginaw, Mich., with a capital stock of $200,000 by F. G. Palmerton, Joseph Seemann and C. C. Brooks. The new company has acquired the plant and business of the Duryea Auto Company and will manufacture trucks. C. E. Duryea states that he will not be interested in the new organization, but, in company with others, will, as soon as a site can be selected, build a factory for the manufacture of pleasure vehicles.

The city of Grand Rapids, Mich., is advertising for bids to be opened January 25 for furnishing one 375-h.p. water tube boiler. Information can be had of the American Pipe & Construction Company, that city.

The Jordan & Steele Mfg. Company, Hastings, Mich., has been organized with an authorized capital stock of $10,000 to engage in the manufacture of sink frames and other pressed metal work. The organizers are J. Frank Edmonds, Forrest E. Jordan, Leo P. Burton and J. C. Ketcham.

St. Louis

ST. LOUIS, MO., January 8, 1912.

An increased number of inquiries the past week has reinforced the belief of the machine tool dealers that the new year will be a decided improvement over 1911. Some of the inquiries give evidence of replacement intentions, though not to an exceptionally large extent. At the same time they point the way. Orders continue to be placed for single tools and there is also some interest being shown in second-hand material, which is somewhat encouraging.

The Busch-Sulzer Bros.-Diesel Engine Company has completed the purchase of a nine-acre site in St. Louis at a cost of $173,000, and will build at once office buildings, power house, machine shops and main and smaller foundries at a total cost for buildings and equipment of $500,000. The plant will be the American manufacturer of the Diesel crude oil engine. The company has a capital stock of $2,100,000 and is in the hands of very wealthy German-Americans.

A heating plant and plant house to cost $123,000 are to be built by the Missouri Botanical Garden at once involving considerable new development in heating appliances of this sort for large greenhouses.

A franchise has been granted to David P. Leahy, R. J. Baldwin and Philip A. Smith to build a plant and supply electric light and power to St. Ferdinand and Central townships adjoining St. Louis. They will construct at once.

The machine and boiler shops of the St. Louis Southwestern Railway at Pine Bluff, Ark., were burned January 1 with a loss of $80,0000. The plant will be reconstructed and re-equipped at once.

The Bradley Polytechnic Institute, Peoria, Ill., has completed a power plant at a cost of $70,000 to be used for experimental purposes as well as supply power and heat for all of the institute buildings.

Work has begun upon a $75,000 round house and machine shop for the Iron Mountain system at Argenta, Ark. Considerable shop equipment will be required.

The Concrete Roofing Tile Company, St. Louis, with $50,000 capital stock, has been incorporated by B. N. Brown, of Ironton, Mo.; William Conway, of Kirkwood, Mo.; and F. E. and William Briscoe, of St. Louis, to equip a plant for the manufacture of tile and other products.

The Rayfield Motor Company, Chrisman, Ill., has been organized with $75,000 capital stock by Fred K. Thayer, Albert E. Schnitker and E. E. Staley for the manufacture of power appliances.

The Rockford Steel Fisture Company, Rockford, Ill., has increased its capital stock to $10,000 for the purpose of increasing its manufacturing plant capacity.

The Hill Packing Company, Nevada, Mo., has been incorporated with $35,000 capital stock for the purpose of equipping an independent packing plant at that point.

The United States Hatchet Wrench Company, Peoria, Ill., has been organized with $100,000 capital stock by George and Lewis Rediger and E. W. Oliver to equip a plant for the manufacture of a new combination tool.

The Gridley Sheet Metal Works, Gridley, Ill., has been organized with $50,000 capital stock by George E. Woodell, Roy C. Walker, E. M. Adams and H. S. Drum, and will at once equip a sheet metal manufacturing plant.

The Salem Box Company, Salem, Ill., has increased its capital stock from $50,000 to $70,000 for the purpose of increasing its manufacturing capacity.

The Mexico Power Company, Mexico, Mo., has been incorporated with $300,000 capital stock by S. M., E. K. and P. E. Locke to establish a public service plant.

The Fredericktown Light & Power Company, Fredericktown, Mo., has been incorporated with $15,000 to equip a public service plant at Fredericktown; incorporators, Earl Gates, A. J. Boardman and R. G. Stevenson, all residents of Fredericktown.

The Sterling Coal Mining Company, Sterling, Mo., with $60,000 capital stock, has been organized by S. A. Meddaugh, H. Brown and A. B. Rushton, who will equip mining property which they own.

The Milford Canning Company, Milford, Ill., with $100,000 capital stock to build and equip a plant for a general canning business, has been incorporated by S. G. David, J. H. Besier and Thomas G. Vennum.

The Miller-Sandy Machinery Company, with $10,000 capital stock, has been incorporated at Kansas City, Mo., by M. E. Miller, Seth S. Sandy and James H. McVay.

The William Jessops & Sons, Incorporated, New York, have been authorized to use $27,000 of their $200,000 capital stock in their iron and steel business in St. Louis.

The St. Louis Surfacer & Paint Company, of St. Louis, manufacturers of a preservative for iron and steel used in construction work, has increased its capital stock from $50,000 to $75,000 for the purpose of increasing its manufacturing equipment.

The Illinois Oil Gas Heating Company, White Hall, Ill., with $50,000 capital stock has been incorporated by E. M. Prindle, Edwin S. White and George W. Prindle to manufacture a heater device.

The Victor Machine Company, Webb City, Mo., with $60,000 capital stock, has been organized by J. H. Fritz, J. W. Bosard and P. E. Weeks to manufacture and handle machinery.

The Rawleigh-Schryer Mfg. Company, Freeport, Ill., has increased its capital stock from $50,000 to $100,000 for the purpose of adding manufacturing equipment.

The Bland Mfg. Company, Bland, Mo., has been organized at that place by T. M. Parker, William Lichte and L. F. Niese.

The Lowe Pilgrim Mining Company, with $25,000 capital stock, has been incorporated at Kansas City, Mo., by E. C. Gussman, W. C. Dillon and E. J. Dillon to equip and operate mining property owned by the incorporators.

The Automobile Combination Lock & Circuit Breaker Company, Kansas City, Mo., with $25,000 capital stock, has been organized and will equip a plant for the manufacture of an automobile device.

The Central Illinois Utilities Company, Gilman, Ill., with $325,000 capital stock, has been organized by Harry J. Frith, H. A. Foster and J. B. Grotevant to construct and operate public utilities at that point and elsewhere.

The Thompson Mfg. Company has been organized at Freeport, Ill., with $10,000 capital stock, by Clement E. Thompson, Louis Strohacker and Edward Strohacker to manufacture machinery.

The Quincy Casting Company, of Quincy, Ill., with $10,000 capital stock, has been incorporated by Charles Schnellbacher, Lester Willis and George Beals, and will equip a plant to make general castings.

The oil plant of the Indiana Refining Company, Georgetown, Ky., which was recently destroyed by fire with $125,000 loss, will be rebuilt and new machinery installed.

The Griesedieck Bros. Brewery Company, formed by withdrawing members of the Independent Brewing Syndicate, a merger of several St. Louis breweries, has been incorporated with $150,000 capital stock by Henry E., Anton A. and Raymond B. Griesedieck and will equip a large brewery building already bought for the establishment of an independent brewery in St. Louis.

The Interstate Chemical Corporation has awarded a contract for a fertilizer manufacturing plant at Charlotte, N. C., to cost $350,000. It will have an annual capacity of 50,000 tons, exclusive of the by-products.

The North American Chemical Company, which has completed deals for silicate of aluminum mines near Rome, Ga., has decided to locate plants for the reduction of the ore at Niles, Mich., and Chesterton or Elkhart, Ind.

A large wall paper foctory is to be built at Pueblo, Col., by Fairfax Bros., of Geneva, N. Y. About $150,000 will be invested.

The Buckley Telephone Company, Buckley, Ill., has been organized with $20,000 capital stock by William S. Hale, Harry S. Bossart, Elwin Hull, Frank E. Singleton and William Krumwiedie. Work will begin at once.

The New Southern Milk Condensing Company, Nashville, Ill., with $25,000 capital stock, has been incorporated by W. E. Drake, W. T. Drullard and A. Hilderbrand and a plant will be equipped at once.

The Beatrice Iron Works, Beatrice, Neb., at a meeting of the stockholders authorized an increase in the capital stock from $50,000 to $100,000.

The city of Kingfisher, Okla., will receive bids until January 15, through W. L. Brenham, engineer, for extending its electric light system and installing water works.

Texas

AUSTIN, TEXAS, January 6, 1912.

No important developments in the machinery trade have taken place during the last week. Orders continue very satisfactory, and while there has been no announcement of any projects of unusual magnitude involving the use of large quantities of machinery it is understood that plans are on foot for several such enterprises and some of them will soon reach the stage of development where orders for the machinery will be placed. The demand for irrigation machinery still keeps up exceptionally well and there promises to be more done in this line of industry during the present year than any preceding year in Texas and the Southwest. Conditions in Mexico are also improving rapidly, and now that confidence in the stability of the new government of that country has been restored it is expected that large investments of American and other foreign capital will be made in various lines of industry.

W. E. McNabb will install a plant at Matagorda for crushing oyster shells and converting them into material for road construction, roofing and other purposes.

The plans and specifications for the proposed dam on Elm Fork, near Dallas, in order to provide an additional water supply for that city have been finished and bids for its construction will soon be called for. It is estimated that the dam will cost about $25,000. It will impound about 610,000,000 gal. of water.

The Commercial Club of Brownwood is promoting the establishment of a peanut factory. In order to provide the plant with a sufficient quantity of the product to keep it in operation about 20,000 acres of goobers will be planted in that vicinity.

The Arkansas Cotton Oil Mill Company is preparing to rebuild its cotton oil mill at Texarkana, which was destroyed by fire recently. The structure will cost about $100,000.

Herman Leob will erect a cotton compress at Marshall.

The Consumers' Ice & Cold Storage Company, which was organized at Brownsville recently with a capital stock of $25,000, will install a new ice and cold storage plant.

The Baird Light & Ice Company has been formed at Baird with a capital stock of $20,000. The incorporators are P. A. Hooger, W. W. Wedeborn and E. M. Smith.

The stockholders and directors of the Clifton Copper Company have authorized the erection of a new smelting plant, a 700-ton concentrator and a power plant at Clifton, Ariz., to cost $2,500,000. A site for the proposed plants has been selected just outside the town of Clifton.

The planing mill and box factory of the Madera Company, Ltd., at Pearson, State of Chihuahua, Mexico, which were recently destroyed by fire, will be rebuilt on a more extensive scale, it is stated.

R. B. Humphrey, Throckmorton, and associates will develop an extensive coal field near there. Considerable machinery will be installed.

The Crescent Mining & Mfg. Company, St. Louis, Mo., has obtained a lease on extensive kaolin beds situated five miles south of Gonzales, Texas, from T. F. Harwood. The company will install machinery for getting out the clay.

The City Council of Alice will soon let the contract for the construction of water works plant and distributing system.

The Thompson-Breece Company, Wapakoneta, Ohio, is negotiating with the Chamber of Commerce of El Paso for the removal of its auto-plow factory to that place. It is stated that the plant will give employment to 300 men.

W. M. Adamson contemplates moving his gypsum plaster works from Douglas, Ariz., to Los Angeles, Cal.

The Stamford Oil & Gas Company will bore a number of wells with a view of developing oil on its land leases near Stamford.

A syndicate, consisting of A. E. Macey, C. E. Beck and N. S. Sweeney will establish a cement factory at Dexter, N. M. About $20,000 worth of machinery will be purchased.

The Pacific Coast

SAN FRANCISCO, CAL., January 2, 1912.

Sales of all descriptions of machinery have been greatly curtailed the last fortnight, and it is doubtful whether any important transactions in metal working tools will be closed before the end of January. The outlook, however, is fairly encouraging, with indications of considerable activity in February and March. Railroad interests are counted on for a large volume of business, both in northern and southern California and in the north coast states, and several important inquiries have already been received from this source. Some of the larger general machine shops in this vicinity are also coming into the market, and operators at Los Angeles, who have been extremely conservative for the last six months, are now disposed to go ahead with contemplated improvements. A few inquiries have also been received from the interior of the state, and altogether the spring's business is expected to be the best in several years.

Wood-working machinery, which has received little attention for the last month or two, shows signs of a reviving demand, a number of orders having already been placed on inquiries received before the end of the year. While no large installations are being made, considerable new equipment of high capacity is being placed in plants around the Bay. Many sawmills in various parts of the state are closed for repairs, and in most cases additions are being made to both mill and logging equipment.

Mining machinery remains rather quiet, and no important orders are in sight for quarry equipment, though some improvement was expected in this line. Cement manufacturers are buying comparatively little, finding their present capacity ample for prospective requirements. Many municipalities and public utility corporations are in the market, particularly for waterworks and gas plant equipment.

The San Francisco office of the Allis-Chalmers Company has been removed to the new Rialto Building, at Mission and New Montgomery streets. Offices in this building have also been occupied by Pierson, Roeding & Co., railroad and transmission equipment; the Denver Rock Drill & Machinery Company, and the LaBelle Iron Works.

The Pacific Electric Heating Company is starting work on an extensive addition to its plant at Ontario, Cal., the improvements including a new foundry building.

It is reported that the Dry Land Dredge Company will soon start work on several gold dredging outfits near Palermo, Cal.

The supervisors of Del Norte County, Cal., are figuring on the purchase of a rock crusher and a lot of road machinery.

The Board of Supervisors of Los Angeles, Cal., will open bids January 25 for furnishing a power plant, piping, etc., for the county hospital.

The city of Newburgh, Ore., will receive bids until January 15 for furnishing an internal combustion engine or motor turbine pump and 10-in. supply main.

Eastern Canada

TORONTO, ONT., January 6, 1912.

The voting in the municipal elections held throughout Ontario on New Year's Day gave authority for going forward with many projects which will call for a very large aggregate expenditure on new equipment and plant. In several of the towns and cities agreements with the representatives of manufacturing companies proposing to establish principal or branch works in the municipality were approved by the property-owning ratepayers. Many large municipal schemes of improvement were also sanctioned. A very important part of the public business attended to by local electors was the empowering of Municipal Councils to enter into agreements with the Ontario Hydro-Electric Power Commission for a supply of power. This means that a considerable additional number of villages, towns and cities will be installing distribution systems, and that the Commission will have to extend its transmission lines accordingly. Further, the Commission is arranging to transmit from centers of power supply other than Niagara Falls. This will entail the spending of millions of dollars in the Tract Valley, in the Ottawa Basin, in the Georgian Bay district and elsewhere in Ontario.

The Canadian Locomotive Company, Kingston, Ont., is now arranging to extend its works to provide for an increased capacity and will make an expenditure of some $400,000. The plant is now working at its full capacity.

The West Main street shops of the Goldie & McCulloch Company, in Galt, Ont., will be enlarged at once. The company will erect a stone building that will join the main structure. In it will be placed a very large and powerful crane that will greatly facilitate the work of the shops, which are now producing the heaviest class of steam engines, etc.

The London & Northwestern Railroad, London, Ont., is having plans prepared for a dam and power plant to be built at Rock Glen, near Arkowa, in connection with a railroad to be built to that point. Smith, Kerry & Chace, engineers, Toronto, will have charge of construction work, the estimated cost of which is $3,000,000 for railroad, dam and power plant.

Western Canada

WINNIPEG, MAN., January 5, 1912.

The weather has been exceedingly frosty for most of the time since Christmas, and building operations are almost at a standstill. A good deal of work was done in December, the weather having been much milder than the average for that month. The outlook for structural work in the spring is very favorable. Preparations are already being made for a considerable number of business blocks. Collections have improved a little recently, and as a great quantity of the grain crop is still to be marketed it is expected that money will be coming to hand in a satisfactory way all through the winter and in the spring.

W. A. Black, general manager of the Ogilvie Flour Mills Company, Ltd., Montreal, is at present in western Canada looking for a suitable site for another large flour-mill in these provinces. It will likely be about 3000 barrels capacity.

The total of building permits in Winnipeg in 1911 was $17,584,000, or about $2,000,000 more than in the preceding year.

It is reported that the Hines Lumber Company, a Wisconsin concern, has purchased the big lumber mill of the Shevlin-Clarke Company at Ft. Frances, western Ontario. It is said that the new owners will double the capacity of the plant and also that the Shevlin-Clarke people will erect another mill further up the river in the same district.

The North West Canada Trust Company, Ltd., Vancouver, B. C., is to erect a large office building in that city. The architects are J. P. Mathiesen & Co., Vancouver.

A 10-story office building is to be erected on Lombard street, Winnipeg, for John D. Atcheson. George A. Fuller Company, 1001 Union Bank Building, intends bidding and invites figures on the different trades, viz., carpentry, passenger elevators, plumbing, heating, lighting, ornamental iron, etc.

Storey & Campbell, Beatty street, Vancouver, B. C., are contemplating the erection of a big business building.

The Standard Fisheries, Ltd., Vancouver, has taken out a permit in Calgary, Alberta, for a cold storage building.

Surveys have been completed for mine tramway and mill site for the Rambler-Cariboo Mines, Ltd., at Sandon, B. C. The machinery is to be shipped in before the roads break up in the spring.

The Tyee Copper Company, Ladysmith, B. C., has closed down temporarily for the purpose of extending the works. Arrangements are now being made to commence the installation of converters and the general enlargement of the plant at an early date. This will include a sintering plant and possibly a lead furnace.

The ratepayers of Ft. William, Ont., have approved the by-law giving certain municipal privileges to the National Tube Company. In a letter published in the local papers Frank A. Samwell, the head of the company, says: "Just as soon as weather conditions permit we shall commence to build, and I hope in one year from to-day to be able to invite the citizens to witness the starting up of the plant."

It is expected that many big American contractors will come north during the winter months to take subcontracts on the Grand Trunk Pacific main line. Among those who are said to be figuring on work are Burns & Jordon, Grant Smith & Co., Twohey Bros. and Martin Welch. They will bring with them a large amount of heavy equipment, and this will be augmented by a number of large outfits to be purchased by Foley, Welch & Stewart themselves. As much of this equipment as possible will be taken to the scene of operations while the winter trails are good.

Trade Publications

Automatic Machinery.—Windsor Machine Company, Windsor, Vt. Catalogue. Gives in 24 pages a comprehensive description of the construction and operation of the Gridley automatics which include both multiple and single spindle types. After a brief discussion of the earlier designs, the automatic machines and their tools are taken up and described at considerable length and with numerous illustrations. Views of the various machines are given with the different parts marked for convenience in ordering repairs.

Contractors' Tools.—Harold L. Bond Company, 383-391 Atlantic avenue, Boston, Mass. Three pamphlets. Illustrate an extensible trench brace, a concrete spade and tamper and a diaphragm pumping engine having a capacity of 3500 gal. per hour.

Iron and Steel.—Arthur C. Harvey Company, 374 Congress street, Boston, Mass. Catalogue. Size, 9 x 11 in.; pages, 133. This catalogue, which is the second edition, supersedes all previous lists and covers the line of iron, steel and metals handled by this company. The standard steel classification of extras and tables of weights and comparisons of gauges are first given and this is followed by lists of the various sizes of machinery, structural and cold rolled steel; refined bar, Wayne, Norway and Swedish iron; sheet metal and roofing material, conductor pipe and fittings, tinner's tools and machinist's tools and supplies handled by this company. Under each classification complete lists of the various sizes with prices are given and where possible these tables are supplemented by half-tone engravings. A six-page index which renders the finding of any article easy completes the catalogue.

Calendar.—Draper Company, Hopedale, Mass., builder of looms, has issued its annual calendar. The general arrangement is the same as in previous years, a calendar pad measuring 6½ x 9¼ in. occupying the lower portion of the hanger. The calendar for a month is given on one sheet, followed by two leaves with spaces for memoranda. Where portions of two months occupy the same leaf, the dates are printed in contrasting colors. The last leaf contains a complete calendar for the year 1912.

Electrical Machinery and Appliances.—Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Two circulars and four folders. Circular No. 1028 is devoted to the rotary converters of this company which are built in all sizes from small machines for laboratory demonstration purposes up to units of 3000-kw. capacity. The special features of these converters are increased efficiency and simplicity and compactness of construction. The illustrations show the machines assembled as well as their various parts, a number of installations and wiring diagrams of typical rotary convertor substations. No. 1190 calls attention to the type E engine-driven alternating-current generators, which are built in capacities from 50 to 1100 kva. and for voltages ranging from 240 to 2400. The construction of these generators is given in some detail and the text is supplemented by half-tone engravings. An illustrated description of one of these generators appeared in *The Iron Age*, February 9, 1911. Folders Nos. 4215 and 4216 illustrate and describe a line of alternating and direct current switchboard meters which are made in the round dial, edgewise, illuminated dial and graphic types. Folder No. 4210 treats of the type OA watthour meter which was designed especially for small lighting loads. The last folder, No. 4217, relates to the type C watthour meters which are made in the single and polyphase types for either house or switchboard use together with prepayment and portable meters.

Steam Turbines.—De Laval Steam Turbine Company, Trenton, N. J. Pamphlet and catalogue. The former, which is entitled "Comparative Tests of Large Engine and Turbine Driven Centrifugal Pumps," deals with the test made at the Torresdale filter plant of the Philadelphia water supply system and is a reprint of the article that appeared in the Engineering News, May 11, 1911. The installation which was tested comprised several compound engine-driven centrifugal pumps each having a capacity of 45,000,000 gal. per day against a head of 45 ft. and one steam-turbine-driven pump having a capacity of 50,000,000 gal. per day against the same head. The results of this test showed that the turbine-driven pump developed a duty of over 21 per cent. in excess of that shown by the compound engine-driven pump, that it also required less attention and seemed to be maintained more easily. Catalogue C is a 32-page album which illustrates and describes briefly the several lines of steam turbines, centrifugal pumps and other centrifugal machinery built by this company. The various types are all illustrated and brief descriptions are given under the engravings. Mention is also made of a turbine reduction gear and pinion, an illustrated description of which appeared in *The Iron Age*, April 13, 1911.

Ice Making and Refrigerating Machinery.—Vilter Mfg. Company, 1008 North Clinton street, Milwaukee, Wis. Bulletin No. 11. Gives a partial list of users of this company's ice making and refrigerating machinery together with the capacity of each installation.

Steel Shafting.—George V. Cresson Company, Allegheny avenue West and Seventeenth street, Philadelphia, Pa. Pamphlet. Deals with the line of turned steel shafting which this company has manufactured for some time. The selection of the stock for the shafting and the way in which it is made are discussed and this is followed by a brief list of the sizes in which it can be supplied.

Blowers.—L. J. Wing Mfg. Company, 90 West street, New York. Bulletin No. 10. Describes and illustrates the company's Hypress blower which consists of a simple outer body with end covers in which the drum revolves. One of the features of this blower is its small number of moving parts, four, a design which has resulted in great durability and a minimum of wear and tear. Test curves and half-tone engravings of the blower are included.

Heating and Ventilating.—Green Fuel Economizer Company, Matteawan, N. Y. Catalogue No. 137. Size, 6 x 9 in.; pages, 94. Is a more or less complete book on heating and ventilating describing the fans, blowers, exhausters, Positivflo steam heating coils and the complete heating and ventilating equipments built by this company. After a general discussion on the importance of heating and ventilating and the various systems by which it is secured the different types of apparatus built by this company are illustrated and described. Different installations employing this apparatus are also shown and this is followed by a number of tables giving data for use in the design of heating and ventilating systems.

Pumping Engines.—Luitwieler Pumping Engine Company, 123 Ames street, Rochester, N. Y. Folder. Illustrates a pumping engine the special advantages of which are perfect balance and lack of vibration.

Graphite.—United States Graphite Company, Saginaw, Mich. Pamphlet entitled "The Management and Cleaning of Steam Boilers." Describes the way in which scale forms in steam boilers by the precipitation of impurities and shows how by using the specially prepared boiler graphite of this company in a boiler after cleaning a fine polish is imparted to the plate which prevents the formation of this scale. Constant applications of small portions of this graphite are said to prevent the formation of new scale and to soften up the old so that it can be easily removed. Directions and suggestions for the management and cleaning of steam boilers are given and a number of testimonial letters complete the pamphlet.

Speed Reducing Transmission Gear.—D. O. James Mfg. Company, Chicago, Ill. Bulletin E. Shows the various types of speed reducing transmission gears built by this company, and contains a brief description of their design and construction. One of the special features of these gears is a low center of gravity by which stability and rigidity are secured. A table showing the dimensions of the various sizes of gear is given. An illustrated description of this device appeared in *The Iron Age*, August 10, 1911.

Planers.—Cleveland Planer Works, 3148 Superior avenue, N. E., Cleveland, Ohio. Folder. Refers to an open side planer which is built in a number of sizes from 30 to 72 in. These machines can be supplied with any length of bed with one or two heads on the rail and one on the side and with either right angle or a parallel belt or electric motor drive. The construction of this planer is described at some length and there are a number of half-tone engravings illustrating the special features of its construction.

Air Pumps.—Wheeler Condenser & Engineering Company, Carteret, N. J. Bulletin No. 103. Points out the advantages of using the Wheeler-Edwards air pump for operation in connection with condensers. The function of the air pump and its relation to the condenser are taken up and this is followed by a description of the construction and operation of the pump and a comparison of its efficiency with that of other types of pumps. Various uses for this pump are discussed such as with the high vacuum dry tube condenser for steam turbines, as well as special applications of the pump to marine and sugar refining work. The bulletin is profusely illustrated with engravings of the various types of pumps and there is an outline drawing for convenience in ordering repair parts. An illustrated description of the Wheeler dry tube condenser appeared in *The Iron Age*, October 7, 1909, and among the installations shown is the one at the Westchester plant of the Bronx Gas & Electric Company which was illustrated in *The Iron Age*, August 11, 1910.

Mechanical Stokers.—Ironworks Company, 1 Montgomery street, Jersey City, N. J. Booklet. Points out the advantages of using the Crowe stokers, which are claimed to be smokeless, economical, durable, readily adjustable and easy to operate. These stokers, which are of the chain grate type, can be applied to all the standard types of boilers and there are a number of engravings showing installations of this kind. A number of testimonial letters and the results of several tests complete the pamphlet.

Vacuum Cleaners.—B. F. Sturtevant Company, Hyde Park, Mass. Bulletin No. 1006. Points out the special advantages of the Sturtevant vacuum cleaner which was illustrated in *The Iron Age*, February 24, 1910. One of the particular points about this cleaner is the use of a fanwheel that is revolved by an electric motor to which it is directly connected to produce suction.

Machinery Lubrication.—Richardson-Phenix Company, Milwaukee, Wis. Catalogue. Gives a description of the individual oiling and filtering systems of this company which were illustrated in *The Iron Age*, December 16, 1911, together with various types of oil filters, mechanical lubricators, oil and water separators and sight feed and gang oilers. Among these pieces of apparatus are the Richardson sight feed oiler and the Phenix sight flow indicator, illustrated descriptions of which appeared in *The Iron Age*, February 2, 1911, and March 3, 1910, respectively. The booklet also contains a discussion of the need and economy of machine lubrication and several pages are devoted to the nature and price of oils together with a simple method by which they may be tested.

Current Metal Prices.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly report.

IRON AND STEEL—

Bar Iron from Store—

Refined Iron:
1 to 1⅞ in. round and square ... ℔ 1.70¢
1½ to 4 in. x ⅝ to 1 in. ... ℔ 1.70¢
1½ to 4 in. x ¼ to 5-1 ... ℔ 1.80¢
Rods—⅝ and 11-16 round and square. ℔ 1.80¢

Angles:	Cts. ℔ lb.
3 in. x ¼ in. and larger	1.80¢
3 in. x 3-16 in. and ⅛ in.	2.20¢
1½ to 2½ in. x ⅛ in.	1.95¢
1½ to 2¾ in. x 3-16 in. and thicker	1.85¢
1 to 1¼ in. x 3-16 in.	1.95¢
1 to 1¼ x ⅛ in.	2.00¢
⅞ x ⅛ in.	2.10¢
⅞ x ¼ in.	2.15¢
⅝ in. x ⅛ in.	3.35¢
¼ x 3-32 in.	4.40¢

Tees:

1 in.	2.25¢
1¼ in.	2.10¢
1½ to 2½ x ¼ in.	1.90¢
1½ to 2½ x 3-16 in.	2.00¢
3 in. and larger	1.85¢
Beams	1.80¢
Channels, 3 in. and larger	1.80¢
Bands—1½ to 6 x 6-16 to No. 8	2.00¢
Burden's "H. B. & S." Iron, base price	2.95¢
"Burden's Best" Iron, base price	3.15¢
Norway Bars	3.60¢

Merchant Steel from Store—

	℔ lb.
Bessemer Machinery	1.70¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black

	One Pass, C.R. Soft Steel.	R G. Cleaned
No. 16	℔ lb 2.45¢	2.85¢
Nos. 18 to 20	℔ lb 2.50¢	2.95¢
Nos. 22 and 24	℔ lb 2.55¢	3.05¢
No. 26	℔ lb 2.70¢	3.15¢
No. 28	℔ lb 2.75¢	3.35¢

Russia, Planished, &c.

Genuine Russia, according to assortment ... ℔ lb 12 @ 14½
Patent Planished. W. Dewees Wood ... ℔ lb A. 10¢; B. 9¢ net

Galvanized

Nos. 12 and 14	℔ lb 2.75¢
No. 24	℔ lb 3.10¢
No. 26	℔ lb 3.30¢
No. 28	℔ lb 3.60¢

No. 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—

Galvanized

Nos. 22 and 24	℔ lb 5.50¢
No. 26	℔ lb 6.00¢
No. 28	℔ lb 7.00¢

Corrugated Roofing—

2½ in. corrugated.	Painted.	Galvd.
No. 24 ... ℔ 100 sq. ft.	$2.75	$4.70
No. 26 ... ℔ 100 sq. ft.	2.85	3.90
No. 28 ... ℔ 100 sq. ft.	2.50	3.65

Tin Plates—

American Charcoal Plates (Per Box)

AAA Charcoal:	
IC, 14 x 20	$6.35
IX, 14 x 20	7.60
A Charcoal:	
IC, 14 x 20	$5.30
IX, 14 x 20	5.40

American Coke Plates—Bessemer—

IC, 14 x 20 ... 107 lb	$4.20
IX, 14 x 20	5.20

American Terne Plates—

IC, 20 x 28 with an 8 lb coating	$8.10
IX, 20 x 28 with an 8 lb coating	10.10

Seamless Brass Tubes—

List November 13, 1908 ... Base price, 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908 ... Base price, 18¢

Copper Tubes—

List November 13, 1908 ... Base price, 21¢

Brazed Brass Tubes—

List February 1, 1911. 20¼¢ ℔ lb

High Brass Rods—

List February 1, 1911. 15⅜¢ ℔ lb

Roll and Sheet Brass—

List February 1, 1911. 15⅝¢ ℔ lb

Brass Wire—

List February 1, 1911. 15⅜¢ ℔ lb

Copper Wire—

Base Price, Carload lots mill 15¼¢

Copper Sheets—

Steel Copper Hot Rolled, 16 oz. (quantity lots) ... ℔ lb 19¢
Sheet Copper Cold Rolled, 1¢ ℔ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ℔ square foot.
Sheet Copper Polished over 20 in. wide, 2¢ ℔ square foot.
Planished Copper, 1¢ ℔ square foot more than Polished.
Tinning, one side, 3½¢ ℔ square foot.

METALS—

Tin—

Straits Pig ... ℔ lb 47¢ @48 ¢

Copper—

Lake Ingot ... ℔ lb 15¼ @16¼¢
Electrolytic ... ℔ lb 15¼ @15⅝¢
Casting ... ℔ lb 15 @15¼¢

Spelter—

Western ... ℔ lb 7¼@ 7⅝¢

Zinc—

No. 9, base, casks.. ℔ lb 8¾¢. Open, ℔ lb 9¼¢

Lead—

American Pig ... ℔ lb 5½@5⅝¢
Bar ... ℔ lb 7 @7¼¢

Solder—

½ & ½ guaranteed ... ℔ lb 26¾@27¼¢
No. 1 ... ℔ lb 24½@25 ¢
Refined ... ℔ lb 23 @23¾¢
Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson ... ℔ lb.. @10¼¢
Hallets ... @10 ¢
Other Brands ... 9@ 9½¢

Bismuth—

Per lb ... $2.00@$2.25

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingots for remelting (ton lots).. 21¢
Rods & Wire ... Base Price 31¢
Sheets ... Base Price 33¢

Old Metals—

Dealers' Purchasing Prices Paid in New York.

Copper, heavy and crucible	12.25
Copper, heavy and wire	12.00
Copper, light and bottoms	11.00
Brass, heavy	8.50
Brass, light	6.50
Heavy machine composition	10.50
Clean brass turnings	8.00
Composition turnings	9.00
Lead, heavy	4.00
Lead, tea	3.75
Zinc, scrap	4.75

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